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CYCLOPÆDIA
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VOLUME TWELVE

Diseases of the Tubes, Ligaments, Pelvic Peritoneum and Pelvic Cellular Tissue; Extra-Uterine Pregnancy,

BY

L. BANDL, M.D.,

PROFESSOR OF OBSTETRICS AND GYNECOLOGY AT THE UNIVERSITY OF PRAGUE.

AND

Diseases of the External Female Genitals; Lacerations of the Perineum,

BY

P. ZWEIFEL, M.D.,

PROFESSOR OF OBSTETRICS AND GYNECOLOGY AT THE UNIVERSITY OF ERLANGEN.

WITH ONE CHROMO-LITHOGRAPH PLATE AND 88 FINE WOOD ENGRAVINGS

EDITED BY

EGBERT H. GRANDIN, M.D.

OBSTETRIC SURGEON TO THE NEW YORK MATERNITY HOSPITAL; INSTRUCTOR IN GYNECOLOGY
AT THE NEW YORK POLYCLINIC; FELLOW OF THE OBSTETRICAL SOCIETY, ETC.

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The Diseases of the Tubes, the Ligaments, the Pelvic Peritoneum and Cellular Tissue Extra-Uterine Pregnancy.

BY

L. BANDL, M.D.,

PROFESSOR OF OBSTETRICS AND GYNECOLOGY IN THE UNIVERSITY OF PRAGUE.

PART I.

DISEASES OF THE TUBES AND EXTRA-UTERINE PREGNANCY.

CHAPTER I.

THE DISEASES OF THE TUBES.

THE tubes and the uterus come from the same layer and are developed from the ducts of Müller. At the eighth week of embryonic life those parts of the ducts of Müller which form the uterus and vagina coalesce, whilst the upper part out of which the tubes are formed remains separated. Thus the tubes are composed of tissue similar to that of the uterus. At puberty they are from 3½ to 3⅝ inches in length. Their outer covering is the peritoneum; under this is the thicker tubal layer, the muscularis, which is separated from the peritoneum by a delicate layer of subserous connective tissue. We can distinguish an outer layer of longitudinal fibres and an inner of thicker transverse fibres, both of which connect with corresponding layers of uterine muscle. Under the muscularis is the submucous layer, composed of wide-meshed tissue which is in contact with the inner wall of the tube. The latter is a movable folded mucosa, provided with ciliated cells, and is continuous with the peritoneum at the fimbriated extremity. The well-developed ciliæ generate a stream from the ostium abdominale towards the ostium uterinum, and will assist the transit of the ovum rather than that of the spermatozoa.

Here we will mention that Lawson Tait says that the tubes play a more important part in menstruation than the ovaries. He was led to this conclusion by the fact that the menopause was brought about when only the tubes were extirpated, and also because during ovariotomy at the time of menstruation he found no swollen follicles in the healthy ovary, which he did find during the interval. Sänger thinks that very likely this opinion of Lawson Tait is further fortified by the fact that tumors of the tube frequently cause a prolonged cessation of the menses.

The mucosa lies in numerous longitudinal folds that run parallel with one another and encroach on the lumen of the tube. Hennig says that there are from three to five large folds and about twice as many smaller ones. The tubal mucus usually forms a thin grayish covering of the surface.

Hennig describes and figures tubal glands, which are probably the same that Bowman saw. Kölliker could not prove the existence of the glands, and Luschka, Henle and Klob considered them to be simply folds of the mucous membrane.

The muscularis of the tube is thicker at the inner than at the outer half, and forms a sphincter tubæ at the uterine opening. The folds in the mucosa are most marked in the outer half of the tube (ampulla of Henle) and gradually diminish towards the uterine end, so that in the interstitial part they can no longer be recognized with the naked eye. The tubal end terminates in from four to five larger and eight to ten smaller fimbriæ, one of which (fimbria ovarica, Henle) usually extends to the vicinity of the ovary. The fimbriæ are so thin and delicate that they readily contract adhesions with neighboring organs and with one another; they are so commonly found *post-mortem* that we must conclude that adhesions often occur during life without any special disease. It is easy to understand why the tubes so often participate in diseases of the uterus and ovaries since their physiological and histological relationship is so close.

An especially favorable opportunity is given for the extension of catarrhal processes from the uterus, and these then easily cause the above-mentioned adhesions between the fimbriæ and the folds of mucous membrane, forming the commonest cause of the most frequent disease of the tubes, hydrops tubæ.

Even to-day there is no doubt that the pathological anatomy of diseases of the Fallopian tubes has far exceeded our clinical insight. We find *post-mortem* anomalies and catarrhs of the tube with a varying amount of mucus, nay even strictures and malformations and even tumors of the existence of which we had no suspicion during life; yet the influence of which on the woman's health and fecundity must have been unmistakable.

In more than half the uteri of female bodies, according to Hennig in three fourths of the cases, according to Winckel 205 times in 500 cases, we find morbid changes and signs of catarrh in the tubes.

Even if we must admit that we are unable to recognize the position, shape and contents of slight changes in the tubes, fortunately diagnosis is not so difficult when the changes have become more marked and a palpable tumor has appeared. The opinion that tubal tumors cannot be distinguished clinically has lost some validity, since our methods of examination have become more perfect, and necropsies and continuous clinical observation have shown us the connection of many formerly isolated symptoms.

The exploratory method of Simon of examination of the pelvic organs through the rectum, and the recognition of morbid processes there from the bladder, after dilatation of the urethra, and the method of examination elaborated by Noeggerath of New York, have contributed a great deal to the recognition and differential diagnosis of the slighter changes in the uterus and its appendages. Noeggerath drew down the uterus with a tenaculum, and, with one forefinger in the bladder and the other in the rectum, explored by conjoined manipulation. It is possible, if the vagina is relaxed and the uterus movable enough, to feel the uterus, the ovaries and the tubes, and it is thus certainly possible under favorable circumstances, to appreciate very slight changes in the pelvic organs. Noeggerath was able by this method, in one case, to clearly outline the left tube, which was irregularly swollen to the size of a goose-quill, and to follow it outwards a certain distance from the uterus. At the same time swelling and softening of the corresponding ovary and the normal state of the right Fallopian tube was appreciated.

Even without the aid of Noeggerath's method it is in many cases easy to palpate the annexa of the uterus, and when the abdominal walls are thin and relaxed, it is often possible by ordinary bi-manual examination to recognize the normal ovaries and tubes or very slight changes in them. In recent times the publication of cases in which during life diseases of the tubes were diagnosticated and confirmed by necropsy has become more frequent. We cannot therefore doubt the possibility of diagnosing tubal maladies, especially when they reach an extent such as to imperil life. It is to be hoped that in some cases at least certainty of diagnosis will be attained, and that we may thus occasionally by a timely surgical interference prevent a tubal sac, filled with pus or blood, from emptying its pernicious contents into the abdominal cavity, and hinder an ovum which is developing in the tube or in its abdominal end from a further growth and rupture which imperils and in most cases destroys the life of the woman.

Even already, five years after the first appearance of this work, great progress has been made in diagnosis and treatment in this field. To mention only one thing, salpingotomy, or the removal of all the uterine annexa, has been perfected in very many cases; thus J. Veit performed laparotomy successfully after diagnosing a tubal pregnancy of three months duration.

On the Entrance of Fluid into the Tubes.—The finding of spermatozoa on the ovary and the occurrence of graviditas extra-uterina has proved that fluid can reach the abdominal cavity from the uterus through the tube.

The serious accidents which have followed the injections of medicinal fluids into the uterus or vagina, with an occasional fatal result, render it certain that a portion of the injected fluid, especially when thrown in without proper care, often reaches the tubes and passes through them into the cavity of the abdomen.

We ourselves have seen a woman suddenly attacked with an acute colicky pain, so severe as to cause her to sink to the ground and render her incapable of stepping into bed, after a vaginal injection which she gave to herself while sitting over a wash-basin. As the pains continued for a whole day over one side of the uterus, it appeared probable to us that a bubble of air had in some way reached the uterus and tube.

Oldham believes that the entrance of fluid is possible when the inner passages are patent from stiffness of their walls; but it is also possible to imagine that an accidental movement of the muscular tissue of the uterus might cause such a suction that a bubble of air might reach the tubes. In one case Haselberg proved by autopsy that a solution of the chloride of iron had reached the abdominal cavity through the tubes. In another case Dr. Ernst Späth observed the entrance of a solution of acetate of lead into the abdominal cavity. A healthy woman, who had been confined ten weeks before, gave herself vaginal injections for ten days in a crouching position with a common fountain syringe. At the eleventh injection there was most severe pain in the lower part of the abdomen and a fainting fit set in; seventy-four hours later the woman died of peritonitis. The necropsy showed irregular, roundish, grayish-black accumulations which were but slightly adherent and did not correspond to any injection either of the serosa or mucosa. They covered the serous surface of the large intestine up to the umbilicus and were scattered throughout the entire hypogastrium, sometimes forming masses of from $\frac{1}{12}$ to $\frac{1}{6}$ of an inch in diameter. These masses proved to be sulphate of lead.

For the elucidation of the important question of the possibility of the entrance of fluid into the tubes, Hourmann performed certain experiments on the cadaver which Klemm repeated under Hennig's guidance. It appeared, 1, that if a tube is thoroughly wedged into the cervix uteri, and if with more force than is necessary for the washing out of the organ a large volume of fluid is injected, a portion of it will in many cases penetrate through the tube into the abdominal cavity while another portion will enter the uterine body through the vessels; 2, if a more moderate force be used the fluid will very seldom penetrate further than a line into the uterine ends of the tubes, more often going into the vessels; 3, if we inject gently through a tube which does not entirely fill the cervical canal, fluid will enter neither the tubes nor the uterine vessels.

These experiments show us proximately the manner in which injury is done, namely by fluid entering the tubes. The opinions as to the ease or difficulty of penetration of fluids injected into the uterus are even to-day so divided that a large number of gynecologists will only permit the injection of the uterus after dilatation of the cervix, indeed they regard this danger as so great that they look upon failure to previously dilate the cervix as an error of technique.

In this division of opinion it seems proper for us to relate our own experience with intra-uterine injections.

We were accustomed to inject the non-puerperal uterus usually without dilatation of the cervix, in many hundred cases of obstinately bleeding mucous membranes; we do it here and there in suitable cases to-day; and we have never noticed penetration of fluid into the tubes or any other dangerous occurrence. The reason for the safety when Braun's syringe is used, comes from the fact that it is held firmly, so that only the walls of the organ can be brought into contact with the trickling fluid, and usually only from one to five drops are necessary. Under careful supervision we even permit physicians to give these injections to dispensary patients.

One important precaution with these injections, as with every medical intra-uterine application, is to watch the contraction of the organ while it is being done. Strange to say we do not know that any one has emphasized the importance of this precaution; and yet a careful observation of it will give assurance to the whole procedure. Many a bleeding uterus grasps the tube of the syringe, as soon as the first drop of the solution of the chloride of iron is thrown in, so that it can only be moved by the exertion of considerable force. In another case it may take five or ten drops to produce the same effect. If the procedure has caused a powerful contraction we have done all the good that we can by injecting; every extra drop only does harm, for the body of the uterus firmly grasps the tube of the syringe. The resistance of the lower parts of the uterus may during contraction be greater than that of the uterine openings of the tubes, and thus the fluid is forced into them and most serious accidents are caused.

ANOMALIES OF FORMATION.

The most important congenital anomalies of the tube are mentioned under the subject of the faulty development of the uterus.

Abnormalities of Length.—F. Winckel found in 500 female bodies, three pairs of exceptionally long tubes, four and a half to five inches, while in twenty-five cases they were of unequal length.

Abnormalities of the Ostia of the Tubes.—Klob has called attention to the very varying form of the ends of the tubes. Occasionally we find on the inner wall of the outer third of the tube, small hernial dilatations. These occur from the mucous membrane insinuating itself between two separate muscular layers of the organ. Very often these little herniæ have a slit at their apex, and thus form supplementary openings of the tube. Rokitansky and Klob believe that these dilatations can occur from diseases of the tubes, such as a chronic catarrh.

It happens in some cases that in a single tube, a second and even a third fully developed and fimbriated ostium is present. (The accessory tubal mouths of Rokitansky.) In 500 female bodies F. Winckel found accessory tubal ostia twice. Hennig in 100 female subjects found an accessory tube three times.

All these abnormalities are of developmental rather than practical interest. It has not been proved that they have any influence either on conception or upon the course of an extra-uterine pregnancy.

ANOMALIES OF POSITION.

These are partly congenital and partly acquired.

Congenital abnormalities of position are due to faulty development of the uterus, or congenital or false position of that organ or of the ovaries.

In these cases the tubes are often placed more perpendicularly, and in certain abnormal developments of the uterus we find them displaced towards the pelvic wall. Often in consequence the peritoneal duplication is shortened.

At times we find the ovaries changing their position as the testicles do, approaching the internal inguinal ring, and even reaching the labia, when there exists a processus vaginalis peritonei. In this way congenital ovarian tubal inguinal hernias are caused, which under certain circumstances may drag the uterus also after them. (Klob.) In the Berlin Obstetrical and Gynecological Society, Lomer described the genitals of a well-developed girl of twenty-one years of age, in which the left ovary and left tube had passed into a peritoneal pouch.

The acquired Anomalies of Position.—These must accompany all malpositions of the uterus and ovaries. During life we often find them in Douglas's *cul-de-sac.*

Most commonly they are felt during life in cases of retroflexion and version, with a moderately enlarged and descended uterus; it is less easy to appreciate the tubes in other positions and axial changes of the uterus. In cases of hydrops tubæ, or when the tube is in any other way increased, it is frequently dislocated into Douglas's pouch. Even a pediculated or non-pediculated hydatid can separate the fimbriated end from the ovary.

Important changes of position must occur in the tubes when there is prolapse and inversion of the uterus. In the latter case, when the inversion is of long standing, their lumen becomes contracted here and there, as Wilde has proved in a case of extirpated uterus.

In two cases of extirpation of the uterus for long-standing inversion, we ourselves found the tubes thickened at their original attachment to the uterus, and at the same time very much narrowed; in a third case one tube was entirely obliterated.

During the development of ovarian cysts, fibromata of the uterus, extra-uterine pregnancies, and other tumors in the neighborhood, the tubes are often markedly displaced. As Rokitansky has said, at the beginning of the separation there is hyperplasia; but in some instances the tube is entirely separated from its ovary. Oftener the ovary will be wound spirally around the ligamentum ovarii. On puncturing a cyst the vascular tubes may be wounded, and blood escape into the peritoneal cavity. The prolapse of a tube into a hernial sac is of rare occurrence. Thus Parker, while doing a herniotomy, cut off the fimbriated extremity of a tube without injuring the woman. Bérard found the dropsical tube in the sac of a left crural hernia.

Hennig relates two cases of true prolapsus tubæ. We ourselves have observed its occurrence twice during operative procedure; once, when amputating an inverted uterus with a galvano-cautery, the uterine extremity of the tube was drawn down to the entrance of the vagina. In the other case, about half an inch of the right tube fell through a wound in the posterior vaginal vault. In both cases the patients recovered after reposition of the tubes.

INFLAMMATION OF THE TUBES.

This may be catarrhal (salpingitis catarrhalis) or may involve all layers of the organ (salpingitis).

The first form often occurs in hyperæmia, and non-virulent inflammation of the uterus and its surroundings. In the second form it is often found with severe inflammatory processes of the genitals, such as tuberculosis, gonorrhœa and actino-mycosis.

Since tubal catarrhs are commonly found *post mortem*, and frequently cause sterility, we will consider them here at somewhat greater length.

CATARRH OF THE TUBES.

Pathological Anatomy.—Catarrh of the Fallopian tube, salpingitis catarrhalis, rarely occurs alone, but is usually found together with the same process in the uterus, or its surrounding structures. Hennig records but a single case, that of E. Wagner, in which tubal catarrh was the only *post-mortem* finding. An ulcer perforated the softened tube, and caused fatal peritonitis in the pregnant woman. It is common, however, as an accompaniment of other morbid processes. I found in 100 uteri more than half affected with catarrh of the tube.

We must distinguish, with Klob and Hennig, between acute and chronic catarrh of the tube.

In the first form, the acute catarrh which so often affects prostitutes, both tubes are usually thickened, lengthened and convoluted. The fimbriæ are swollen; the mucous membrane is relaxed and movable, being less red than usual in its inner and more red than usual in its outer portions. Hennig says that the microscope shows the epithelium enlarged and filled with particles of fat. Transparent drops go from the base of the ciliated cylindrical cells to the free surface, and there are arranged in mosaic-like figures; in the spaces between are the remains of the broad cells of the reddish shimmering mucus, which to the naked eye appears yellowish or greenish white.

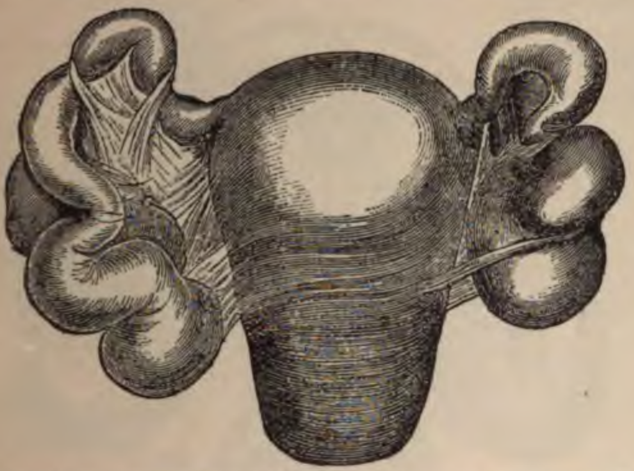

FIG. 1.—TUBAL CATARRH WITH ROSARY FORM OF THE TUBE AND PERISALPINGITIC REMNANTS (*Heitzmann.*)

This thin mucus is not alkaline like normal tubal mucus, but is neutral or acid. It consists in a small part of mucin, but mostly of an albuminous mucoid matter, which Hennig has called hyalin.

There are usually also adhesions of the mucous membrane and of the fimbriæ to each other or to the ovary; and in consequence of the ever-present peri-salpingitis, the tubes are bent, drawn out of place and sealed to various places on the uterus, Douglas's pouch, the intestines or even to one another. The outer half of the tube is usually most affected, and the delicate and movable abdominal extremity is often closed. This happens less commonly at the ostium uterinum, though it is often swollen and constricted.

The chronic catarrh almost always proceeds from the acute, since the conditions in the tube are most unfavorable for the healing of a catarrhal process. Acute exacerbations occur from insignificant injuries. Both tubes are usually affected in chronic catarrh, the abdominal and sometimes the uterine end being closed. F. Winckel, in 205 cases of tubal disease, found atresia of the tubes 38 times, tumors of the tube with a larger or smaller collection of secretion, 28 times, and adhesions to surrounding parts 93 times; one tube being affected in 47 cases and both in 46 cases. Albers found the ostium abdominale closed in 35 cases, and the ostium uterinum only in 9 cases. In consequence of the closure of the ostia, and the subsequent accumulation of mucus, the tubes are lengthened, swollen and sacculated in several places; hence the tubes acquire rose-wreath forms, which Rokitansky calls hydrops tubæ saccatus. The mucous membrane is thickened, or may be thinned if there is much fluid; according to Hennig, there is increase of the little folds and often polypoid growths. The color is reddish or bluish, the small veins are often

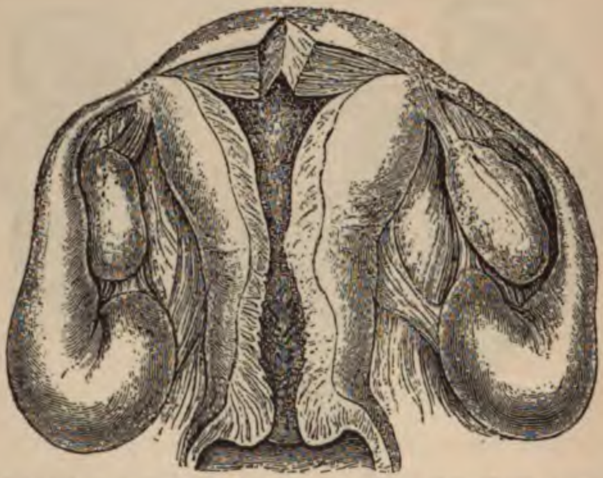

FIG. 2.—TUBAL CATARRH WITH CLOSED ABDOMINAL END, SACCULATED TUBES AND PERISALPINGITIC RESIDUES. The dilatation of the cervix shows that there was catarrh present. (*Heitzmann.*)

injected, while the tubal mucus often contains the remains of hemorrhages. This mucus is abundant and of varying color and consistency; a moderate pressure will cause it to flow into the abdominal cavity. Hennig, to whom we owe the more minute study of tubal catarrh, found indican present. It reacts alkaline or acid, that is on both red and blue litmus paper. The microscopic components are non-ciliated epithelial cells, changed in old cases to pavement and spindle cells, sometimes abundant blood corpuscles and fatty granular cells.

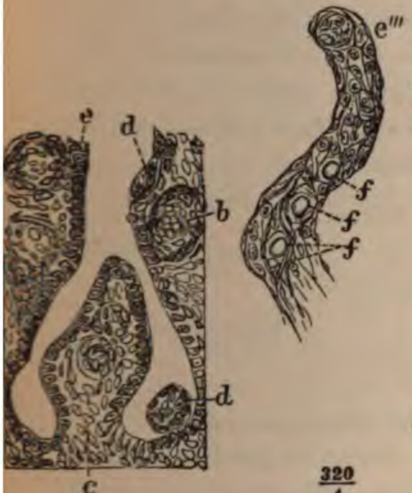

FIG. 3, *a*.

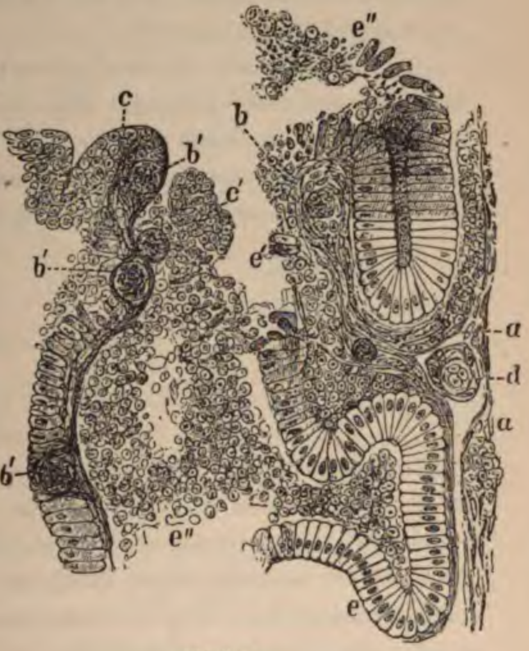

FIG. 3, *b*.

FIG. 3, *a*.—SECTION OF NORMAL TUBE.

FIG. 3, *b*.—SECTION OF TUBE WITH CHRONIC CATARRH. *a a*, immature; *a′* mature connective tissue; *b*, vessels; *b′*, dilated veins with hernial projections above the mucous membrane: *c*, median folds; *c″*, epithelial covering; *dd*, smallest folds of the mucous membrane; *ee*, healthy epithelium; *e′* ciliated; *e″* desquamated epithelium; *e‴*, empty epithelial sheath; *f*, hyaline drops in the same. (After *Hennig*.)

In more advanced cases the deeper layers of the tube are changed. The muscularis is thinned or absent, the peritoneal coat shows cloudy places, and the swollen tubes are sealed or united to neighboring parts.

Etiology.—Catarrh of the tube is seldom primary. From increased physiological activity the uterus and the adnexa are more disposed to disease. Thus we see that a menstruating or puerperal woman is especially susceptible to injury. Intercourse, drink, exercise, chilling of the abdomen and feet while menstruating, cause catarrh of the tubes. Do we not see during that time other congestions and inflammations of the uterus and vicinity arise? I refer to parametritis and hæmatocele. Hennig found one case due to acute phosphorous poisoning. Gravidity in one tube causes catarrh of both (Kiwisch) or of the other tube (Kussmaul.)

It would be hard to believe that traumatisms would cause tubal catarrh and subsequent hydrops (P. Frank); but it is easily comprehensible how irritant medicines injected into the uterine cavity may cause catarrhal inflammation of the tubes.

Secondary disease of the tubes occurs most frequently from gonorrhœal infection, and from puerperal diseases. Acute inflammations of the uterus and pelvis, acute exanthemata, typhus, cholera, tumors of the ovaries and of the uterus are causes. As regards age it is found during the child-bearing period. Thus Hennig found it:

In childhood, ...	5 times	
17 to 30 years, . . .	10 "	(3 times acute catarrh)
31 " 46 " . . .	16 "	
47 " 60 " . . .	8 "	(1 acute catarrh)
61 " 81 " . . .	5 "	

In otherwise healthy women tubal catarrh may often be cured; but not so when it occurs in those having heart lesions, tuberculosis, chlorosis, scrofulosis, kidney disease or amyloid disease. Here the acute catarrh soon assumes a chronic form, which continues until the women die of their other troubles. Hence it is that we so commonly find chronic tubal catarrh and its consequences in the bodies of women who die after the menopause.

Symptoms and Diagnosis.—It is impossible to present a clear picture of tubal catarrh, since disease of the vagina, the uterus, and its neighborhood, usually accompany it. If prostitutes have frequent attacks of violent colicky pain, bilateral colicky pain, and increasing at menstruation, and if we find no explanation for their occurrence in the uterus or ovaries, we may suspect the existence of tubal catarrh.

In Noeggerath's case, where the catarrh was probably caused by gonorrhœal virus, the twenty-six year old woman fell sick shortly after marriage. The severest pain was in the left lower abdominal region, and always increased during her scanty menstruation; at the same time the woman had occipital and infra-mammary neuralgia.

It is easy to understand that the catarrhal process should have an unfavorable influence upon the life of the zoa-sperm and the progress of the ovum; and we can suspect tubal catarrh though we can not demonstrate it in cases where we find no other cause for sterility.

Since the symptoms are only probably those of tubal catarrh, it has always seemed to us to be hazardous to diagnose the malady positively.

Noeggerath diagnosticated pelvic peritonitis from catarrh of the left tube in his case. The long-continued suffering caused Noeggerath to make an examination as above described, and he discovered the left tube swollen to the size of a goose-quill. Since he found swelling and softening of the left ovary at the same time, it is by no means certain that the symptoms were caused by the tubal catarrh alone. Among the consequences of tubal catarrh, we must first mention hydrops tubæ, and since peculiar symptoms are caused by it in life, we will treat it separately.

HYDROPS TUBÆ, HYDROSALPINX.

Catarrh and inflammation of the tubes themselves, as also a partial peritonitis of their ostia, may cause closure of the abdominal ends of the tubes, adhesions to surrounding objects, and stricture and closure of the ostium internum.

A total or partial closure of a tube hinders the flow of secretion, which normally only trickles into the uterus or peritoneal cavity in very small quantity; the histological composition of the inner surface and its secretion becomes pathological. If the ostia now become closed, there occur the above-mentioned sacculated swelling of the tubes, which have the most varied contents.

This is sometimes similar to the serum of blood, or it may be a more or less thick bloody or purulent mucus. Often the fimbriæ enter the lumen of the tube, and grow to one another by their peritoneal surfaces, so that each fimbria is projected forward by the pressure of secretion, and the end of the tube assumes a peculiar roseleaf-like appearance. (Schröder.)

Often the hydrops begins as a hemorrhage, as in hæmatometra and hæmotocolpos. We then find within the sac the remains of the blood.

Hydrops tubæ can reach a considerable size. Rokitansky, Klob, Froriep and others have seen it the size of a child's head; Bonnet found thirteen pounds of fluid in the left tube, and Peaslee of New York described a case in which the abdominal tumor was punctured three times as a cystovarium. Necropsy showed a right ovarian cyst, while the left tube was transformed into a sac containing thirty-three ounces of a thin fluid. The uterine mouth of the diseased tube was closed. These large tubal sacs, however, when they are not tubo-ovarian cysts, are very rare; they are usually sausage-shaped swellings with two or three constrictions two to four inches long, one to three inches wide.

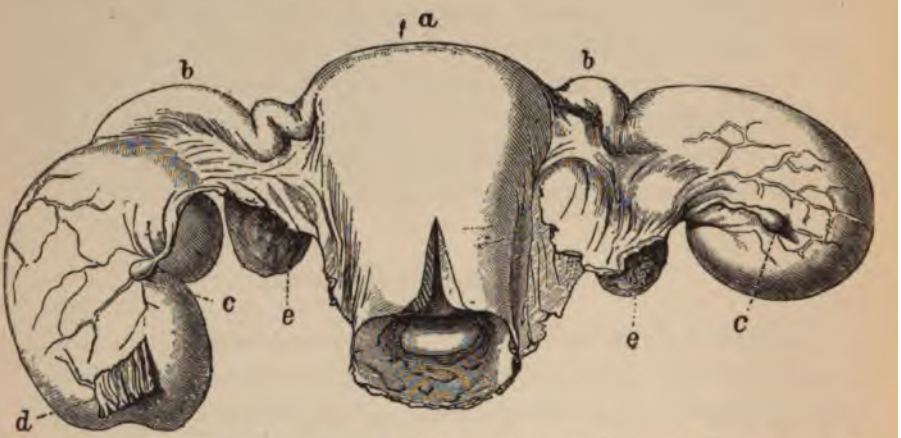

FIG. 4.—HYDROPS TUBÆ. *a*, uterus, cervix split in front; *b b*, Fallopian tubes; *cc*, terminal cysts; *d*, false band which is adherent to the tumor of the right tube; *ee*, ovaries, natural size Alcoholic preparation. (*Hennig.*)

The older cases were probably ovarian cysts, which were adherent to a lengthened tube. Thus Harder found in one 140 pounds, Merklin 40 measures, Cyprianus 150 pounds, van Swieten 112 pounds of fluid

The shape of the smaller tumor is usually club-shaped, with its point turned toward the uterus; sometimes it is large at its beginning, but it is almost always divided by a furrow a finger's breadth from the uterus; sometimes a pigeon's-egg-sized swelling is situated at the end of the tube.

Dropsy of the tube is frequently bilateral. The cysts are often sunken behind the ovaries in the cavum recto-uterinum; only seldom do we see the larger tumors of the tube situated at the brim of the pelvis. Pseudomembranes are almost always attached to them from all parts of the pelvic peritoneum, and give them the most varied position and shape.

If both mouths are open but strictured, there can probably be but a small accumulation of secretion; yet absolute closure of the ostia is not necessary for the formation of hydrops tubæ.

Froriep, therefore, distinguishes two forms of tubal hydropsy, the *hydrops tubæ fallopii occlusæ*, where both ostia are closed, and *hydrops tubæ fallopii apertæ*, where the ostium uterinum is open.

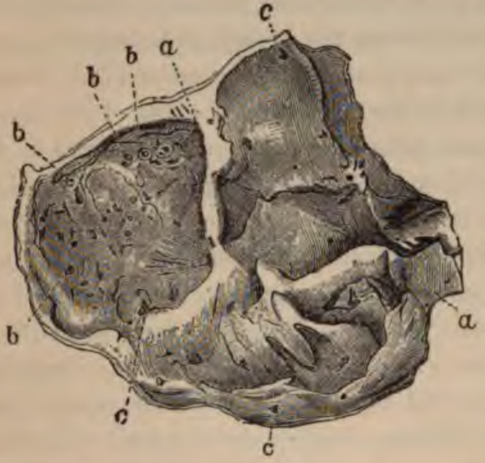

FIG. 5.—TUBAL CYST LAID OPEN. *aa*, protruding folds of mucous membrane; *bb*, vesicles; *c*, brown pigment. (*Hennig.*)

The naturally narrow ostium uterinum has its lumen further encroached upon by the swelling of the mucous membrane, which thus hinders the free outflow of the secretion.

HYDROPS TUBÆ PROFLUENS.

If the ostium uterinum is open, and if behind it there is a fluid containing tubal sac, and if from a mechanical impetus or from inflammation the amount of its contents are increased, the fluid will from time to time flow into the uterus and be evacuated. This phenomenon has been termed *hydrops tubæ profluens*.

One of the first reliable cases of fluid accumulation in the tube with periodical outflow is that of P. Frank. "After a sudden fall on the hypogastric region there appeared in a woman a considerable tumor at the place, together with stretching and tearing pains. Then there appeared with the menses a flow of clear watery fluid. Menstruation then ceased while the watery flow lasted daily for half a year, at least a pound being lost every day, until finally the patient died of exhaustion. The necropsy revealed thirty-one pounds of a watery fluid in the left tube."

iwisch and Förster distrusted the older observations, though Rokitansky and Klob believed the process to be beyond dispute. Scanzoni described a case where a woman sixty years old died of cardiac disease in whom the right tube was swollen to the size of a goose-egg with fluid, while the left was transformed into a sac the size of a chicken's egg, containing only a few drachms of a sanguinolent fluid, which was in open connection with the uterine cavity by means of a canal 1½ inches in length and about ½ inch in diameter. Klob found similar lesions often in elderly women, and is much inclined to consider those cases, in which menstruation re-occurs late in life after a long pause, to be instances of hydrops tubarum profluens sanguinolentus: as Heyfelder found in a seventy-eight year old nun in whom menstruation re-occurred after a twenty-six year absence. Others have described similar cases. Very recently Hausammann has reported a case of hydrops tubæ profluens in Frankenhäuser clinic, which, since it was observed and diagnosticated during life, we will refer to further on.

Not infrequently we find the enlarged abdominal end of a tube ending in the walls of a cavity of the ovary itself. This happens either because an ovarian cyst which had contracted adhesions to the tube had emptied into it, or because the pavilion of the tube had grown to the ovary where a riper Graafian follicle burst. The secretion of these cavities causes enlargement of the tube (Klob). Such tubo-ovarian cysts were first described by Ad. Richard and Labbé; first observed by Rokitansky and Klob; and first demonstrated by Hennig, Beaucamp and others; F. Winkel found them twice in 500 female bodies.

If the uterine mouth remains open a periodic flow of secretion may take place, which Blasius (1834) described as hydrops ovarii profluens; in Richard's case the inner third of the tube was dilated, and the secreted fluid flowed freely into the uterine cavity.

One of the first consequences of hydrosalpinx, since it is usually bilateral, is sterility; if the tubes are large they may rupture, and consequently peritonitis is much to be feared. If there is a stasis of the normal or the catarrhal secretion of the tube, a moderate irritant or infection, especially at a menstrual epoch, may cause inflammation of the sac wall, and change of the mucous contents into pus. Hydrosalpinx may also end in pyosalpinx with all of its disastrous consequences.

Symptoms and Course.—Smaller swellings of the tube give no certain symptoms during life, and are usually accidentally found at *post mortems.* If larger or inflamed there are always symptoms which attract the physician's attention.

Hausammann's work, which is based upon five clinical cases, teaches us that menstruation is always irregular; there is amenorrhæa for months and then violent metrorrhagia. He is himself inclined to attribute this to laceration of the uterus, to oophoritis, to chronic metritis, or to chronic peritonitis, than to the tubal disease. Sänger confirms this observation as to cessation of the menses in tumors of the tubes. So also the pains have no such pathognomonic character as Th. Lee claims. According to him there is a deep beating pain in the hypogastric region and pubis, which radiates to the inguinal region and thighs. In the case which Frankenhäuser described, the pains were seated principally over the pubis; in the second case, where hydrops tubæ profluens was diagnosticated, the pains at first were entirely absent, and only later became severe, when they were similar to uterine expulsive pains, which was when the contents of the tumor began to increase rapidly in amount and to become purulent. Similar attacks of colic and lumbar pain were seen by Dessauer in a case in which the necropsy showed peritonitis and a perforated tube containing pus. If the tubal sacs are adherent to neighboring organs, great pressure symptoms, obstipation and dysuria will appear; if inflammation occurs fever will accompany it.

But all these symptoms are exactly similar to those that we observe in pelvic tumors, ovarian cysts, cysts of the broad ligament, sacculated exudations in the pelvic space, fibroids and inflammatory processes. We must, therefore, admit that dropsy of the tubes is not accompanied by very characteristic symptoms.

Even the periodic hydrorrœa of hydrops tubæ profluens may be simulated by the periodical expulsion of secretion from the uterus, vagina or their neighborhood.

If the tubal sac reaches a certain size rupture may occur from any slight cause. If the contents are mucous or serous, lethal peritonitis does not necessarily follow. Beigel relates a case in which he observed in a sterile Irish woman of thirty-five years of age, a tumor the size of a man's arm at the right side of the uterus and running towards the ilium. This tumor had already existed for several years and dated from the puerperium; and when Beigel saw the woman again in four months the tumor had disappeared, and the woman only noticed the rupture from a peculiar and quite painless sensation, a diarrhœa that lasted several days and increased urinary secretion. Without feeling certain that a dropsical tube did burst in this case, it is nevertheless certain that a tumor of long standing may empty its contents into the peritoneal cavity without necessarily killing the woman. Carus, Bonnet, Simpson and Spiegelberg have observed and described the bursting of ovarian cysts and recovery without special peritoneal manifestations. I myself took a twenty-year old girl, for the first time pregnant, into the institution. Besides a uterus at the eighth lunar month she had near but distinctly separated from it a swelling of about the same size, with thin walls and fluctuating contents. The girl was spontaneously prematurely confined, and the diminution of the uterus during the eight days of confinement in bed and the unaltered size of the tumor could be easily appreciated. On the ninth day I was called to the young woman because of sudden sickness and fainting attacks. Her face was pale, she had pain in the abdomen, which was flat and showed on both sides an accumulation of fluid of about a hand's breadth; the cyst had undoubtedly burst and a considerable hemorrhage must have also occurred. In five weeks the girl was well, a swelling the size of the two fists being present at the right side of the uterus; a year later there was a tumor only half the size of the fist at the same place. Once we saw the entire contents of a unilocular ovarian cyst the size of a head flow into the abdominal cavity without causing any morbid symptoms. Only a little thin, clear fluid had been evacuated by an exploratory trocar, and after withdrawal of the trocar the entire tumor disappeared in the course of the day to refill itself in five weeks.

If tumors so large rupture without causing the death of the woman we may believe that tubal dropsy may sometimes be cured in this manner; but this termination appears to be moderately rare; as also it seems seldom to happen that a dropsical tube attaches itself to the intestine or bladder and pours its contents into these organs. It is otherwise if there is inflammation of the dropsical tube or its neighborhood; its contents become purulent and increase rapidly in amount; the walls of the sac become attenuated and softened; and the danger of rupture or slower perforation is always threatening. When a pyosalpinx empties into the peritoneal cavity it almost always causes a fatal peritonitis; the symptoms are various and are soon masked by those of the rapidly arising peritonitis. From Hausammann's thesis we gather: the rupture may appear in the guise of a gradually increasing peritonitis (Dessauer), or with bearing-down pains, diarrhœa and disappearance of the tumor (Andral); or sudden and violent lancinating pains at one point and extraordinary tenderness over one hypogastric region (Frankenhäuser). Perforation may occur into the intestine or bladder, as is the case with para and perimetritic abscesses; we then see numerous lactic, purulent, diarrhœal stools (Andral), or pyuria Dupuytren has described a case in which recovery occurred after rupture of a pyosalpinx into the bladder.

Diagnosis.—The certain diagnosis of a hydrops tubæ is only possible in the very rarest cases when there is a coincidence of many favoring circumstances. Since we have seen that tubal dropsy had no characteristic symptoms, and since we can only suspect it when women complain of pain in the lower abdomen, we can only obtain a diagnosis by the bimanual examination. This will only be certainly possible in those cases where the tubal tumor has no special adhesion to its surroundings, so that we can detect the seat of the tumor and the nature of its connection with the uterus. If the tubal tumors are sunk into Douglas's pouch, if they are adherent, or if inflammatory processes lead us to examine the patient, the characteristic form of the tumor is usually lost and it may be mistaken for various conditions, such as small ovarian tumors, soft fibroid, sacculated exudations, etc.

Cases in which tubal tumors have been recognized during life are not rare. Puistienne felt the left dilated tube from the vagina; Schröder detected by touch several small tumors in the neighborhood of the ostium uterinum, and Noeggerath in the above-mentioned case felt the healthy and diseased tube through the bladder and rectum. The possibility of a diagnosis is proved by a case in which Prof. Frankenhäuser diagnosticated during life bilateral salpingitis with fluid, possibly pus, in the tubes and which was afterwards corroborated by autopsy. Hausammann's case was a girl aged twenty-four, who formerly menstruated always regularly and for three months complained of severe metrorrhagia and intense pain over the symphysis, no fever; on palpation only slight tenderness in the left hypogastric region, and no increased resistance; on percussion no dullness. Internal examination showed the fundus of the uterus a little to the right, the uterine cavity deepened ⅓ of an inch and the entire organ pushed against the symphysis. In the vaginal vault, very high up could be felt two small round tumors about a finger's breadth apart. These tumors extended principally towards the brim of the pelvis, so that they could not be thoroughly mapped out. That portion of the tumor turned towards the vault of the vagina showed intestine-like swellings. Both were tender to the touch, the left plainly fluctuating; the right showed a cone-like hard projection. The uterus was 3⅕ inches long, was slightly movable with the tumor, and followed the rotation of the introduced sound, as did the tumors. The vagina was very narrow, the vaginal portion virginal. After dilatation with compressed sponge the uterus was found empty. The patient died with increasing pains in left hypogastrium and peritonitic symptoms; a perforation was suspected fourteen days after the first examination.

The necropsy showed widespread peritonitis. The uterus was united to the rectum by old and firm bands.

At the left side in Douglas's pouch, in the midst of numerous old and recent adhesions, was a collection of pus, and with this there communicated by a hole the size of a cent a sac about the size of a man's fist, which still contained a small amount of yellow pus. The virgin uterus was somewhat lengthened and had a very narrow cervical canal. The right ostium tubæ uterinum was occluded; on the left side, however, an ordinary sound could be passed through the entire thickness of the uterus with ease, up to a stoppage just beyond the organ. Thence ran the left oviduct growing gradually larger, until about 2½ inches from the uterus it was suddenly bent forwards and downwards and changed into the above described perforated sac. This sac was two inches in length, 2⅗ in breadth and height; a mucosa could be distinctly seen on its inner surface. At the point of bending was the perforation, and the dilated tube was adherent to the floor of the pelvis and the posterior wall of Douglas's pouch; in the midst of numerous adhesions lay the walnut-sized and cystic left ovary.

The right tube showed some constrictions and dilatations and was adherent to uterus and rectum.

The girl therefore had hydrosalpinx; consecutive inflammation changed this into pyosalpinx, and this caused a fatal perforation peritonitis.

The diagnostic points are: (1) the shape of the tumor, it being intestine-like and showing swellings and constrictions not found with other pelvic tumors and an inconstant fluctuation; (2) seat of the tumor, which may be in Douglas's pouch or raised above the pelvic brim; or it may be seated at the level of the cervix uteri. Between this and the tubal swelling there is usually a furrow. The bilateral appearance of the disease, as Kiwisch has noticed, can give us some points for the diagnosis. The uterus is displaced to a variable degree; it is crowded to the side opposite to that of the larger swelling, or a large tumor fills Douglas's pouch, the uterus is pushed forwards and upwards exactly as occurs in the case of hematocele retro-uterina. (3.) The nature of the connection between the tumor and the uterus. There is usually a larger or smaller portion of less dilated tube between the uterus and the tumor which is felt as a constriction.

If hydrops tubæ profluens is present, we have one diagnostic symptom more. We can observe the periodic outflow of quantities of fluid and the consequent periodical decrease in size of the tumor; or we may even be able, as Professor Frankenhäuser was, to express fluid from the tubal sac into the uterus and out, and feel the tumor becoming smaller under our hands. This second case of Frankenhäuser is mentioned also by Hausammann and is so interesting and important, that I will relate it briefly, although it was not verified by autopsy:

Girl, twenty-seven years old, nulliparous, sought relief for metrorrhagia. Examination showed a fist-sized soft tumor in the left ileo-cæcal region. Uterus immovable, and latero, anteflexed; sound penetrated two and two quarter inches. In the left vaginal vault was an elastic, immovable, painful and pointed tumor. Some clear serous fluid was trickling from the cervix, and pressure upon the tube caused half an ounce of clear bloody serum to flow into the vagina.

Five days later Professor Frankenhäuser expressed one and a half ounces of the same fluid. Diagnosis of probable hydrops tubæ profluens. The tumor emptied itself gradually, especially at night; in twenty-four days it was the size of a small apple. The bleeding had ceased, and the patient was discharged.

Seven and a half months later metrorrhagia again set in, accompanied with intense abdominal pain. The uterus was now four and two-fifth inches long, turned to the right, and there was a tumor the size of a man's fist. It projected deep into Douglas's pouch, and there was a distinct furrow between it and the uterus. Both moved together. Pressure caused evacuation of a sero-mucus clear fluid. The further course and treatment of the case will be related under the head of therapeutics of the disease.

Thus, as we see, the diagnosis can be slowly arrived at, although the disease may be confounded with many other troubles.

The differential diagnosis in many cases is most difficult and at times impossible. They may be mistaken for tumors of the tube; sub-peritoneal fibroids of the uterus after they have become pediculated, and lie against the broad ligament and contain cyst cavities. Ordinarily they can be distinguished by their characteristic hardness, roundness and distinctly branched form. Martin described a preparation of Lehnert's before the Berlin Obstetrical Society, in which there was hydrops of both tubes. This was of special interest, because Langenbeck had operated on the case for fibroma; shortly after an immovable dense tumor developed, which gave the impression that a new fibroma had formed, but by necropsy it was proved to be a considerable collection of fluid in the tube. Tubal dropsy may also be confounded with exudations and accumulations of blood in the broad ligaments. Exudation is ushered in by marked fever and pain. Accumulations of blood develop suddenly with marked pain, and cause great prostration; opposed to this, diseases of the tubes are of slow advent and can not be felt to exist until the disease is thoroughly developed. To prevent this confounding, bi-manual examination should be made; exudation very soon fixes the uterus. The more rare affection, hæmatocele, closely surrounds the uterus, pushing the vaginal vault downwards. After what has been said, an exudation or hæmatocele can be differentiated from tumors of the tube; but under certain circumstances, as when an exudation or hæmatocele is movable and located in one or the other broad ligaments, in spite of all deliberation and care a positive diagnosis can not be made. I accidentally found an egg-sized coagulum of blood in a broad ligament, which had been removed from the pelvis with the adnexa of the uterus. The surroundings of the extravasation showed no particular adhesions, so that this hæmatocele would, during life, by bi-manual examination, surely have given signs similar to those of hydrops tubæ.

Further, we must differentiate cysts of the broad ligaments and small ovarian cysts. Cysts of the broad ligament are seldom bilateral, and usually do not show the characteristic intestine-like swelling. They can not be diagnosticated from two or three small cysts adherent to each other, so as to simulate a tumor of the tube. Small movable ovarian tumors are often situated in Douglas's pouch, elevating the uterus and pushing it forwards, and providing they do not lock the entrance of the pelvis, they can not be differentiated from hydrops tubæ, and from other conditions. It is absolutely impossible to differentiate a hydrops from a single ovario-tubal cyst that is situated in the abdominal end or the wall of the tube.

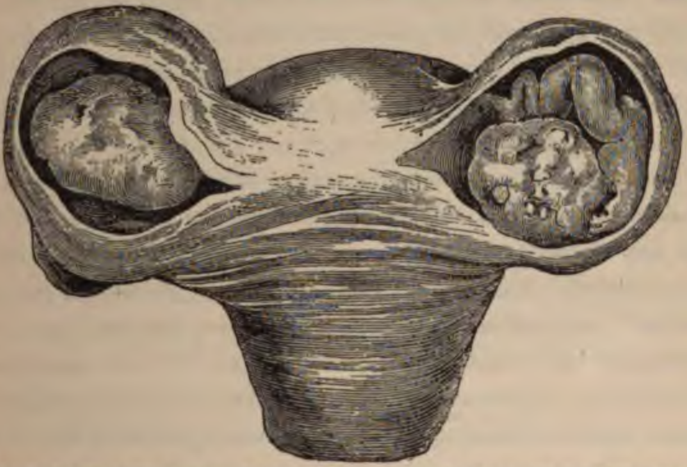

FIG. 6.—THE TUBES AND OVARIES ARE ENCAPSULATED IN FALSE MEMBRANOUS SACS. (*Heitzmann.*)

Courty believes that in similar cases the tumor can only be distinguished as tubal, when the healthy ovary can be felt inside of it. Other sources of error are hæmatometra and hydrometra lateralis, due to duplication and congenital closure of half of the organ. By bi-manual examination a cornua of the uterus dilated with blood can be felt to pit on pressure, as in hydrops tubæ lying against the uterus, and only a careful recalling of the facts, scanty menstruation with gradually increasing pains, the finding of indications of duplication in the vaginal portion or in the vagina, will assist perhaps; in very difficult cases, differentiation can only be accomplished by exploratory puncture. Breisky, in 1873, described a case of hydrometra lateralis, which was verified by necropsy. He was so careful in his research that we can hardly doubt the correctness of the diagnosis. In this case was discovered a ring-like gap in the vault of the vagina, the edges of a projecting seam in the os uteri could be plainly seen, and a walnut-sized cavity was found under the os uteri, that was taken for a rudimentary vagina, to which a rudimentary uterus was attached

After emptying and shrinking of the sac, Breisky was at last positive that the enlarged right side of the uterus was a unicornis, the tube of which and accompanying ovary were found to be situated normally. From the neck of the uterus extended a band-like bridge to the left side of the pelvis, and to a little flat tumor were attached the adnexa of the left side. The ovary and tube of this side were not to be separated, however; one was hard and the other soft, like a small flabby cyst, which formed the principal part of the tumor. Below and a little in front of this adjoining tumor was situated a small cylindrical opening through which a sound passed into the uterus.

Dropsy of the tube may also simulate tubal pregnancy, especially in the abdominal end. With this unfortunate occurrence the uterus and vagina are changed similarly to normal pregnancy, the uterus grows larger and softer. The vaginal portion likewise possesses a marked red appearance, and ordinarily the vagina appears the same as in normal pregnancy; in the breasts you have changes around the nipple and also often secretion. If one has not an opportunity to examine a marked case again and again, so as to appreciate the general growth of the tumor, in many cases it will be found necessary to consider all of the changes in the uterus and vagina, and also the symptoms, to differentiate between extra-uterine pregnancy, hydrops tubæ and other tumors. Tubal pregnancy is unilateral while hydrops tubæ is usually bilateral; by this Kiwisch has made a positive diagnosis from a single examination.

Differentiation is also necessary from remnants of pelvic peritonitis (*vide* Fig. 6). The catarrhal secretion in the tube is easily changed to pus by infection, which may result from a simple examination, more especially from an intra-uterine, when strict antisepsis is not resorted to.

Inflammation of the tube (salpingitis) usually follows acute diseases of the uterus and its surroundings. The more severe forms belong to the puerperal period.

Marked symptoms are caused when tumors or new formations in the uterus or its neighborhood become inflamed. We have seen severe inflammation of the tubes in decomposing fibromata of the uterus. Hennig saw it accompany carcinoma of the uterus. It is often a catarrhal process, affecting the entire thickness of the wall, and there is a marked production of pus. The mucous membrane is more or less reddened and swollen according to the intensity of the inflammation. The deposit can be stripped off and is similar to a croupous membrane, or ichorous pus may have formed, and often diphtheritic ulceration is present.

The inflammation may extend to the peritoneal covering (perisalpingitis), to the ovaries (perioöphoritis), also to the pelvic peritoneum (pelvic peritonitis) and often to the general peritoneum, as especially described by Förster, Buhl, Hecker and others. In many cases we find inflammation of the structures in the neighborhood of the displaced ostium abdominale, the fimbriæ assume the most peculiar shapes, become agglutinated one with the lateral ligament, one with the ovary, to the left with the sigmoid flexure, to the right with the colon; or the ostium inverts itself and its peritoneal surfaces grow together (Klob), or even one tubal end becomes adherent to the other. By these adhesions the ostium abdominale becomes closed and an accumulation of pus in the tube takes place, to which occurrence is given the name of pyosalpinx or tubal abscess. Hennig's two cases should be so recognized whether the accumulation of pus was as above-described or in the wall of the organ.

Pyosalpinx, as it has been described, may develop in two different manners: (1) a chronic process causes a hydrops tubæ, which is changed to pus by acute inflammation; (2) it can be rapidly produced by an acute process.

Course and Development.—The accumulation of pus in the tubes is always to be looked upon as serious, while the bursting of a pus-containing tube-sac usually causes a fatal peritonitis. The pus will either escape through the natural contracted openings of the tubes or through a perforation.

This result can often bring about a very sudden unforeseen danger to the patients. Once we attended a necropsy on a woman suffering from carcinoma, who suddenly died from the bursting of a pus-containing tube, and a consequent peritonitis; a very interesting example has been described in Frankenhäuser's clinic.

It is more dangerous for a pyosalpinx to empty itself into the abdominal cavity than to become adherent to the neighboring organs and empty itself into them. A not infrequent occurrence is for a pus-containing tube-sac to perforate into a pseudo-membranous encapsulated pus centre. Under such circumstances, after a long existence, it may even end in a favorable way by fatty degeneration, calcareous degeneration (Klob), absorption, or later these pus cavities may rupture into the free abdominal cavity, or into neighboring organs.

A noteworthy example has been described by Kiwisch. A patient in Andral's clinic aged thirty-seven years, who gave birth without trouble to her last child seventeen years ago, for three months had been sick without apparent cause. The most prominent symptoms were constipation, pain in the lower part of the abdomen, occasional vomiting and colic. In August a sudden pain appeared in the left side, and the patient noticed that a swelling was forming in the groin, which was accompanied by a numbness in the left leg. In September was found a very tender deep-seated swelling about the size of a small dinner-plate. Vomiting and colic became continuous, and degeneration of the ovary with peritonitis was diagnosticated. Later obstipation and diarrhœa set in, and during

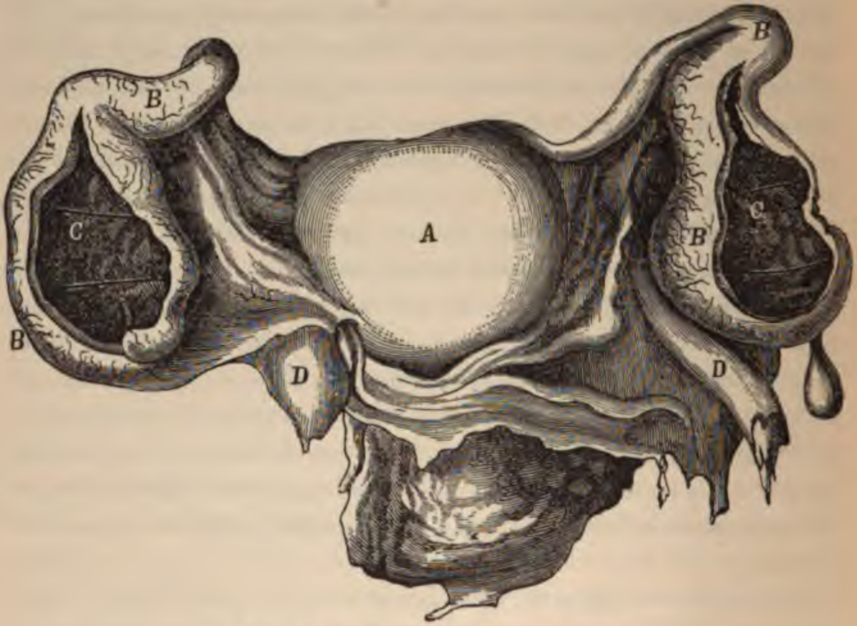

FIG. 7.—INFLAMMATION OF THE TUBES. (*Hooker.*)

October it became bloody, causing rapid loss of strength, so that on October 9th a severe colic was followed by death.

The autopsy showed general peritonitis with sero-purulent exudation, with slight adhesions of the intestinal coils, which were also bound to the left groin. After these adhesions had been separated, a deep-seated tumor was found on the left side of the uterus in the neighborhood of the rectum. On the inner side of the rectum was found a perforation the size of a quill, which communicated with the described tumor, on pressing which pus could be forced into the rectum. This perforation was at a level with the brim of the pelvis near the sacro-iliac symphysis. The tumor was soft, shrivelled, and no opening could be found excepting the one communicating with the rectum; it occupied about a quarter of the true pelvis, to the left side and behind the rectum, which it displaced upwards and to the right. On close examination it could be seen that this swelling was formed from the left tube, part of which lay against the left side of the uterus, and could easily be traced; an inch outwards it could not be traced On opening the tumor, that part of the tube situated next to the uterus was found expanded into a sac, beyond which the tube could not be followed. Behind this large pus-centre a second tumor was situated about the size of a walnut, which was the ovary that was also found to contain pus, although it was not connected with the surroundings. The left side gave the appearance of generally altered relations; also here the outer end of the tube was expanded and contained a small amount of pus. The ovary was markedly diseased, forming a tumor about the size of a hen's egg. Furthermore, the rectum was found constricted at two places with follicular ulceration of the gut.

In favorable cases a pus-containing tube forms adhesions with the abdominal wall or vagina, through which it perforates externally.

In a more favorable case the pus is easily absorbed, or undergoes fatty, calcareous or cheesy degeneration, in which case the tube is partially or totally obliterated (Klob.)

Rarely is a healthy Fallopian tube contained in the wall of a periüterine abscess. Köberle described in the Strasburg Medical Society one of these rare occurrences. The patient, a woman aged sixty, for twenty years had had symptoms of pus formation in the pelvis. Every two or three weeks occurred the discharge of a large amount of pus through the vagina, which lasted for two or three days. On the posterior surface of the uterus there was a cyst about the size of a child's head, in which was incorporated the left ovary and tube, with its plainly seen fimbriæ. From time to time during life the collected pus discharged through the tube.

On the Possibility of Sounding the Tubes.—In hydrops tubæ are collections of pus in the tube, and it is natural to think of probing and catheterizing the Fallopian tube. The idea occurred to Dr. Tuchman, of London, of the possibility of finding the mouths of the ureters in men, and to Simon the possibility of sounding and catheterizing the ureters from the bladder, and Dr. Pawlik has described the sounding of the same in women without dilatation of the urethra. Tyler Smith (1849) claimed that he had many times successfully sounded and catheterized the Fallopian tube for sterility. At the same time Robert Froriep (1850) proposed to bring about closure of the Fallopian tubes by passing a sound into the uterus with its point armed with caustic, and by this means, in women with markedly contracted pelvis, to bring about organic closure of the tubes, and to cause sterility so as to obviate the necessity of performing Cæsarean section. For this purpose Froriep has devised a special instrument—a hollow uterine sound through which a whalebone bougie can be passed. The hollow sound is to be passed to the fundus of the uterus, and then should be so turned that its opening lies against the uterine opening of the tube; through it is then passed the whalebone bougie, which is to find its way through the intra-uterine portion of the tube.

When we undertake to sound a diseased tube, we must take into consideration the fact that in the cadaver, under normal conditions, the tubes of married or unmarried women cannot be sounded by large or small sounds, as has been proved by Albers, Hennig, Wegner, and myself. Also during life, with wide uterine cavities, the dilatation may give rise to the idea that possibly the situation of the tubes, which has never occurred to me, may be found and the sound passed. We must always take into consideration the fact that the sound can be passed through the uterine substance near the opening of the tube. This easily happens when the uterus is still in the condition of puerperal involution, as was observed by Rabl-Rückhard and Lehmus, that on the thirty-fourth day after delivery it is easy to pass a sound through the uterine wall into the abdominal cavity, and Wegner demonstrated by necropsy the presence of perforation of the muscularis of a dilated and partly fatty uterus. In the same manner the sound was easily passed through the uterus in four other cases. Hönig describes perforation of the uterus, and Alt two cases where the sound was passed from six to seven inches into the uterus of a recently delivered woman, causing perforation; Tait also described such cases in the Lancet of 1872–3. Perforation of the uterus with the sound can very easily occur in extra-uterine pregnancy, a case of which we have ourselves observed and described. In this case by very light pressure the sound was passed nine inches, perforated the uterus and produced the impression that the tube had been sounded; but the necropsy showed a perforation close to the uterine opening of the right tube. It is interesting to notice that in almost all described perforations of the uterus reaction did not occur. It was so in four cases of Rabl-Rückhard and Lehmus, in three cases of L. Tait's, in our own, and also by Zini, who could in seven cases in the first six weeks after involution pass his sound eight inches into the uterus, and often felt the knob of the sound through the abdomen to one side of the median line without reaction.

From these various observations it is doubtful whether a tube has been sounded, and it is certain that the greatest care is necessary in such an undertaking.

In opposition are the following observations, where it is claimed that during life one or the other tube was sounded: Duncan, Veit, Hildebrandt and others believe in the possibility of passing a sound into the uterus and tube, and under certain abnormal circumstances they are more or less sustained by pathological conditions, Bischoff having described and proved by necropsy a case where in life without doubt a tube was sounded. Following is a short description of the case: In a woman aet. sixty-five, suffering from ovarian tumor, a sound was passed with little force 6½ inches into the uterus without the occurrence of reaction; the point could not be felt through the abdominal wall. The ovarian tumor disappeared and seven days later the woman died. At the necropsy it was found that the uterus was pushed very much to the right and bent. The highest point was at the left tube. The uterine cavity measured 3½ inches and the thick walls gave no signs of injury. In the fundus was found a pigeon-egg sized interstitial fibroma. The uterine opening of the left tube was funnel-shaped, with the point outwards; the tube itself was so patent that there was sufficient room for more than one sound. The sounding of the tube on the cadaver in this case was very easy,' as the uterus was so far bent to the right that the dilated left tube extended directly upwards, so that the uterine opening could not have been missed. But from pathological reasons the sounding of the tubes is surrounded by numerous difficulties. Frankenhäuser unsuccessfully attempted to sound the diseased tube in cases of hydrops tubæ profluens after pressing out the fluid.

On account of the possibility of easily perforating the uterus we hold that it is not rational to attempt sounding the tubes.

Treatment.—Frankenhäuser has often successfully pressed out the secretion of tubal sacs, and we also have observed, in women who suffer from severe uterine colic and similar signs that accompany obscure tumors next to the uterus, that after thorough bi-manual examination large masses of secretion were discharged, upon which the pains always ceased. Such undertakings should only be resorted to when there is no danger of bursting the tubes.

Friction of the abdomen with different anodyne medicines—chloroform with oil to which morphine has been added, warmed before use—is often of service; it appears that by friction of the uterus and diseased tubes the collected secretion is dissipated. Poultices are often of service.

Puncture of Tumors of the Tube.—Simpson claims to have cured many cases by puncture provided they can be reached from the vagina or abdominal wall, are not large and are movable. Care must be taken not to perforate the intestine, which is apt to lie in the way.

If the tube-sacs are adherent to the abdominal wall or rectum it is often impossible to differentiate them from other tumors; but their treatment is similar, for both a small ovarian cyst and hydrops tubæ that can be reached from the vagina are treated in about the same manner. The character of the tumors is determined by their fluctuation, percussion note and principally by their situation, also by passing a medium-sized trocar into them from the vagina. The contents spontaneously flows out through the trocar; if it is thick you can apply a closed syringe to the trocar and aspirate or use a modern aspirating apparatus. Satisfy yourself that the tumor is entirely emptied and it will not always refill. We have seen small fluid-containing tumors remain unfilled for many years after puncture through the vagina; of course we were not positive that these were only the tubes. If the tumor refills at the second tapping, the canula of the trocar can be left in for several days, until thick pus discharges from the wall of the tumor. In case of decomposition of the secretion it is necessary to irrigate with antiseptics. By these means we have seen many women cured of pelvic tumors without knowing whether they belonged to the tubes. In larger tumors, especially when they contain pus, a larger trocar can be used so that the secretion can be washed out through a double catheter; or where we are positive that the tumor is entirely shut off from the peritoneal cavity a free incision can be made into it, and drainage and washing out with a sublimate solution 1 to 2000 from the vagina, may be resorted to. Tapping of smaller tumors through the abdominal wall is seldom possible, and puncture from the rectum we consider dangerous. Frankenhäuser, in a case of hydrops tubæ profluens, after it was impossible to press any more fluid out of the tumor and after he had attempted to pass a sound into the tube, found it necessary to tap three times in quick succession; the sac continued to fill and hectic fever appeared. At the last puncture a trocar ⅓ of an inch in thickness was used, a double current catheter was passed into the tumor, and allowed to remain for seventeen days, through which he often injected a weak solution of permanganate of potash. After removal of the catheter the opening would at times close and the retained pus caused fever; but the pus always burrowed its way out, so that at the end of seven months after the first puncture the woman had entirely recovered. We have had no trouble after tapping cysts that could easily be reached from the vagina. It must be remembered that large cysts of the broad ligament usually develop downward from their starting-point and can be punctured without fear. If the tumors are not easily reached and lie in the front part of the pelvis it is necessary to bear in mind the situation of the bladder. It can easily be injured with a trocar; twice we have seen the bladder emptied with an exploratory trocar, instead of a small ovarian tumor, but fortunately with no bad result. In both cases the punctures closed without treatment and without damage to the women Before tapping from the vagina it is necessary to empty and thoroughly examine the bladder and its surroundings.

Salpingotomy for Hydro- and Pyosalpinx.—If the tumors are isolated, readily recognized and threatening life, or the cause of unbearable pains, it is as justifiable to consider their removal by abdominal section, as it is slightly enlarged ovaries. When in laparotomy one or the other tube is found diseased, there is no doubt that its removal is necessary. Mosetig-

Moorhof successfully removed, with a left ovarian tumor, a right ovary 7½ inches long and five inches in circumference with a pus-containing tube.

Within recent years, according to fixed diagnostic rules laid down by A. Hegar, Lawson Tait, Schröder, A. Martin, Baumgärtner, Gusserow, Kaltenbach, Zeiss, Knowsley Thornton, Sänger and others, salpingotomy is extensively performed.

Modern laparotomy must be more thoroughly developed before, in doubtful cases, salpingotomy should be substituted for tapping from the vagina. The removal of the tubes, on account of numerous adhesions with the surrounding structures and the friability of the tissues, is difficult, and many times partially or wholly impossible. The operation is usually more dangerous than ovariotomy on account of possible infection of the peritoneum from the contents of the tube. A. Martin calls special attention to this danger; in eighteen operations for tumors of the tube he lost five women (four from sepsis).

The method is: Extirpation of the whole sac. When possible use a double ligature between the uterus and the tube, and sever with the Paquelin.

Partial extirpation consists in incision of the sac and sewing its cut edges to the abdominal wound and using drainage through the wound, or sewing in the abdominal cavity and instituting drainage through the vagina (A. Martin).

A. Wiedow has advocated making an incision from the vagina or Poupart's ligament to the tumor, and should it be found adherent on all sides, to incise and drain; but should it be found not adherent the incision should be filled with iodoform or sublimated gauze, and incision of the tumor postponed until it becomes thoroughly adherent to the surroundings, and only then should it be opened and drained. A. Hegar successfully treated a case by making an incision from Poupart's ligament to the tumor which he found free, packed the wound with iodoform, and in a few days made an incision through the vagina, passed a drain through both openings and washed with a sublimate solution 1:2000.

HEMORRHAGE INTO THE TUBES.

Severe grades of hemorrhage into the tubes are rare and occur in and under the mucous membrane (*apoplexia tubarum*); smaller extravasations are also found in these organs, and occasionally may be seen where death has occurred from cholera, typhus fever, small-pox, puerpera and puerperal diseases.

Rokitansky believes that it often comes from bursting of weak blood-vessels, and that the discharge of blood is due to disturbed circulation of the upper organs of the body, as in pleuritis and hepatitis. Klob often found escape of blood in inflammation of the tubes. These small accumulations of blood give rise to no symptoms and are of no practical importance. When the patients do not succumb to the hemorrhage it is absorbed without leaving a trace. There are also described cases of bleeding of the mucous membrane of the tubes that were fatal. Kiwisch has questioned if these fatal hemorrhages are not due to early tubal pregnancy.

Marked congested conditions of the pelvic organs and inflammation and swelling of the mucous membrane of the tubes, may cause a large accumulation of blood on the surface of the mucous membrane, especially at the abdominal end, from which it escapes and forms a cellular hematoma.

Large collections of blood in the Fallopian tubes (hematosalpinx) are of great practical importance. On this account we will more extensively consider these diseases.

Hematosalpinx.—Etiology.—Even as closure of one or both tubal extremities may cause hydrosalpinx, so, under similar circumstances, in case of marked congestion of the mucous membrane, may we have hematosalpinx; or an apoplectic centre in the tube breaks through the mucous membrane, and so also a hematosalpinx is formed. In the same manner accumulations of blood in the tube may be caused by adhesions of the tube to the ovary. Kiwisch and others have found accumulations of blood in a rudimentary tube in a case of absence of the uterus.

These rare causes of hematosalpinx are opposed to the cases where, by closure of the genital canal in any one place, large quantities of blood accumulate. After what has been said, long-standing hematometra and also hematoelytron are the principal causes of the formation of blood-containing tube-sacs. In most of the already mentioned cases the uterus was bicornate, and one side of the double genital canal was closed at a higher or lower point. The higher the atresia in the utero-vaginal passage the sooner a hematosalpinx will be formed. In very deep atresia, or atresia hymenalis, hematosalpinx is rarely observed; the earlier the diagnosis is made in these complaints the better can the disease be treated. But also in a case of atresia hymenalis, according to Hennig's researches, tubal sacs have formed; so it was in a case of Marchant and Mossé, who, after an operation for atresia followed by death, found that the outer part of the tube was distended with blood, which by pressure had trickled out into the abdominal cavity and caused inflammation. Under similar treatment a patient of Th. Paget died seven days after the operation, probably on account of the bursting of the sac.

It is not certain whence the blood comes, whether from the uterus, the ovary, or from the inner surface of the tubes.

In cases where the upper portion of a blood-containing tube-sac is near the ovary, it is always possible that the blood has escaped from a burst follicle. In most cases the sacs are found not connected with the ovaries, and in a large number of these cases the blood-sacs of the tubes were entirely separated from the blood contained in the other part of the genital canal, or were connected to it by means of a narrow passage oftentimes a number of lines in length. Therefore we believe, although in our own following observed case the uterine end of the tube was found wide open, that the blood of hematosalpinx originates from the inner surface of the Fallopian tube; this idea has already been advanced by Rose. When menstrual blood is prevented from escaping from the Fallopian tube the origin of hematosalpinx is explained. We believe that in most cases, with the menstrual process, blood escapes from the mucous membrane of the tube, and that during menstruation the uterine ostia are softened with the entire organ and permit blood to flow regularly into the uterus. If by marked obstruction the flow of blood from the uterus is prevented, it is dammed back in the tubes; in the following preparation, between the hematometra and hematosalpinx is situated the hypertrophied uterine body and an hypertrophied tube three inches long; but at any time the regular flow of blood from the tube into the uterus may be prevented and form a hæmatosalpinx.

As an example of hematosalpinx, we will give one of our own cases with drawings (Fig. 8). The case shows a rare variety of hematosalpinx, its dangers and also the possibility of making a diagnosis.

An eighteen year old girl, who for three years has menstruated regularly but scantily, for the last two and a half years has suffered from severe pain. For one year and a half these pains were principally confined to the menstrual period; but during the last year they increased in severity and later became unbearable.

On examination the pelvis was found to be filled with a tumor the size of a child's head, which reached to the lower border of the ischium. The wide open uterus was held up by the tumor, pushed slightly forward,

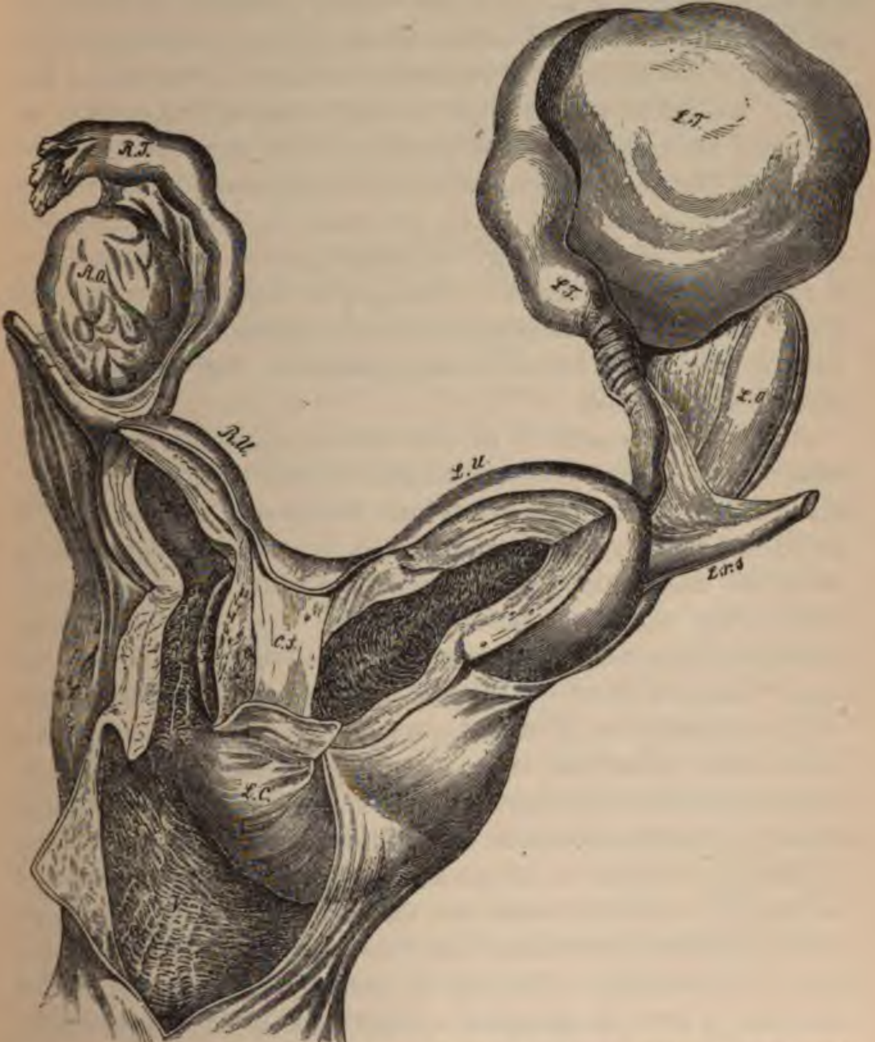

FIG. 8.—HEMATOSALPINX IN A DOUBLE UTERUS WITH UNILATERAL HEMATOMETRA. (Reduced two-thirds.) *R U*, right, *L U*, left uterine body; *R C*, right, *L C*, left dilated cavity; *C S*, septum; *J*, incision; *V*, vagina; *R O*, right, *L O*, left ovary; *R T*, right, *L T*, left tube dilated with blood; *Lrd*, right, *Lrs*, left round ligament.

and could easily be felt through the abdominal wall. The right cervix could be plainly felt at the height of the symphysis, the left was entirely within the wall of the tumor and could only be indistinctly felt as a seam. The upper partition of the cavity was thinned (marked C. S. in Fig. 8), and during life was situated entirely within the vagina, and formed the right wall of the tumor. The left uterine body was situated behind like a cap. We had no idea of the existence of hematosalpinx, perhaps on account of the pain produced by examining. The principal tumor was hard, and, excepting the severe pains, we had seen several cases of fibroma that gave similar symptoms, and for that reason the principal tumor was taken for a fibroma of the cavity. In attempting to enucleate, the mistake in the diagnosis was discovered. Through the incision a pint of tar-like blood escaped. After emptying the entire contents, the sac became markedly retracted, as shown in the preparation. Two days later the patient died from sepsis.

At the necropsy made by Dr. Kundrat the right kidney was found enlarged, with pelvis and ureters dilated, and their walls thickened; the left kidney, including ureter and vessels was absent. The right half of the uterus (R. U.) was normal; in the left the walls were double their normal thickness. The cavity was spherical, the size of the fist, formed into a sac with walls about half an inch in thickness, filled with a dirty thick brown fluid, and with its inner wall covered with a dark brown pigment. This dark brown pigment ended with a sharp line at the uterine body, the inner surface of which was normal in color. The sac formed a hemispherical tumor that reached nearly to the fornix of the vagina. Both cervical canals were separated by a septum pushed to the right, and the inch long incision made at the operation extended to the external orifice.

The left tube rested on the ilium, was six inches long, its outer half was changed into a thick-walled sac, the size of a goose-egg, filled with a dirty, chocolate brown, thick fluid. In places the wall of the sac was thin. The inner half of the tube was markedly thickened, and dilated sufficiently to allow the passage of a rather thick sound into the cornua of the uterus. The left ovary was three inches long, four-fifths of an inch wide, dense, covered with follicles, was included with the tube-sac and, the left adnexa in a rust-brown pigmented false membrane, and they were also adherent to the rectum and uterine wall. The right tube was four and a half inches long, large with thick walls; the right ovary was two inches long, one and a fifth inches wide, containing a cyst the size of a hazel nut, in the neighborhood of which were numerous follicles the size of hemp seed.

Symptoms.—Slight accumulations of blood in the tubes, that may occur without closure of the genital canal, will permit of little description. We know of no symptoms peculiar to large accumulations of blood in the tubes, as they are generally associated with accumulations of blood in the uterus or vagina, and their symptoms obscure those from the accumulations in the tube. The shape of hematosalpinx is similar to that of hydrosalpinx.

Course.—Slight accumulations of blood may be absorbed or stimulate the formation of hydrosalpinx. After studying the reported cases, it appears that accumulations of blood can remain for a long time in the tube without danger, and according to Klebs under the influence of the tube secretion, it remains fluid for a long time. The longer blood-cysts of the tube exist the larger they seem to become. As the contents increase, the walls become thin, by increasing inflammation, the contents become changed, the walls become partly fatty and are prepared to burst. The inflammation of the tube-sacs also affects the surroundings, and adhesions are often formed with the adjacent structures, as has been shown in the above case. Rupture may occur into any organ with which the sac becomes adherent. Gangrene of the blood sac or decomposition of its contents rarely occurs; but if it does death follows. Also blood can escape into the recto-uterine space, and form an hæmatocele. Most hematosalpinges remain stationary until the accumulated blood in the uterus or vagina becomes excessive. If they become very much enlarged their walls are consequently thinned and can easily be ruptured; they are usually bound to their surroundings by false membranes. Spontaneous bursting, which occasionally occurs in atresia hymenalis—Farre lost a patient in this manner—or emptying the tumor by operation, unfortunately often results unfavorably. After emptying, often a cavity the size of a child's head must contract, frequently causing great strain on the thinned tubal cysts, so that they often rupture, or by marked displacement cause an unfavorable change in the contents, or give rise to more extended inflammation. Hennig counts only three recoveries in sixteen operations for hematometra, and we ourselves know of three; only a few of these cases were operated upon under the use of antiseptics.

Diagnosis.—Although hematosalpinx does not give positive symptoms, by careful bi-manual examination it can be diagnosticated.

We have already shown that hydrops tubæ could be determined by bimanual examination, which can also be said of hematosalpinx. Occasionally, where we suspect its existence, the diagnosis may be reached, even though there be no adhesions to the neighboring structures. The possibility of this diagnosis has already been declared by Germann, Hennig, Wilms and others. The shape of the tumor is the same as has already been described for hydrosalpinx. On examination, mostly from the vagina, and occasionally when necessary from the rectum, it must be remembered that too strong pressure on a thin tubal sac may cause its rupture.

Treatment.—In a necropsy on a girl that suffered from hematoelytron and large hematosalpinges, one of the tubal tumors bursting after operation for the hematoelytron, Rokitansky said: "The gynecologists unfortunately discover the nature of these diseases too late." It is well to remember that girls suffering from these complaints never seek medical advice early enough. In order, however, that we may institute an early operation for retention of menstrual blood, and so prevent the danger of the formation of hematosalpinx, it is necessary that the physician's attention should be early drawn to these parts.

We often find between the blood-containing tube and the distended uterus a shorter or longer part of the tube which is markedly contracted or entirely occluded, so that after an operation for hematometra, the tubal blood sacs rarely empty themselves. Owing to the great risk from hematosalpinx, one can only think of a direct surgical procedure, which Haussmann and F. Winckel have already demonstrated to be correct.

NEW GROWTHS OF THE TUBES.

Connective Tissue.—In rare cases the tubes are the seat of fibroid or fibro-muscular tumors, which in structure resemble the same varieties of tumors that often appear in the uterus. Rokitansky describes them as the size of peas or beans; Klob saw such tumors projecting from the outer surface of the tubes, or they were pediculated; Simpson described a fibroma of the tube the size of a child's head.

In chronic catarrh are occasionally found on the inner surface warts and papillomata. Hennig found in 200 cadavers two small polypi of the

Fallopian tube. By proliferation and thickening, the fimbriæ often form small tumors of the connective tissue, which are of the consistency of cartilage, and at the same places also are often found on the peritoneum covering of the tubes fringe-like projections that form the groundwork for small cysts.

In rare instances lipomas from the size of a bean to a walnut, develop in the outer third of the tube.

Cysts.—Hennig separates them into outer and inner. The outer are the more numerous. Hennig found them in 115 cadavers, and, after their discoverer, they were called Morgagni's hydatids. They are the remains of the upper ends of Müller's ducts, and usually develop into pea-sized cysts with thin pedicles one half to an inch long. Klob saw one seven and a half inches long, extending from the anterior surface. In rare instances these formations develop to the size of a walnut, in which case they may separate the opening of the tube from the ovary, and so prevent fecundation. Furthermore, in advanced age cysts, from the size of a poppy-seed to a pea, develop on the broad ligaments or Fallopian tubes and contain a colloid fluid; on the fimbriated ends they often take the form of smaller stationary cysts.

The inner cysts are as follows: They are usually flat, a line in diameter, formed in rows on the inner surface of the funnel-shaped extremity of the tube; in rare instances they also extend to the inner third of the tube. The diseased and dilated parts of the Fallopian tubes appear as sago-like bodies, at the top of which often is seen a dark spot, which was very likely a follicle of the mucous membrane. Also larger cysts are found in this neighborhood. Kiwisch found cysts from the size of a pea to a walnut under the mucous membrane.

Tuberculosis.—Tuberculosis of the tubes often follows tuberculosis of the genitals, but as frequently developes simultaneously with the latter; it may develop at any age, rarely before puberty, is most common during menstrual life, and often developes during the puerperal state. In most instances both tubes are affected at the same time. In many instances tuberculosis of the tubes developes secondarily to tuberculosis of other organs, the lungs, rectum and peritoneum. Rokitansky and Kiwisch, in forty deaths from tuberculosis, found one with tuberculosis of the uterus; F. Winckel found tubal and genital tuberculosis in 1 per cent. of necropsies.

When the uterus and tubes are simultaneously affected,. the latter is more markedly diseased, and many authors, Klob, Foster, Wernich and others, believe that probably the tubes are the prime centre of the disease. The disease begins in the mucous membrane of the abdominal extremities of the tubes, and extends along the organ towards the uterus.

The appearances of the mucous membrane at the beginning are similar to those of catarrh, with slender projecting points the size of a millet seed, of a gray or yellow grayish color; usually the tube is distended with a muco-purulent mass. Later in the disease these tubercular nodules break down and form abscesses in the mucous membrane with extension of inflammation to the walls of the tube, and the organ becomes filled with a soft cheesy mass. The tube wall itself has been perforated by the breaking down of a tubercular nodule. By preceding disease the tubes are frequently extensively dilated, markedly distorted, and occasionally become twisted, and so resist degeneration to the neighboring canals. In very rare cases Kiwisch and Rokitansky have observed the changing of the tubercular mass into a chalky and fatty mass. Klob adds to these statements the idea that these cases are easily mistaken on account of the shrinking which occasionally occurs in a tube that is distended with calcareous matter, or thick pus, such as follows catarrhal inflammation.

Diagnosis.—The elder Chiari, of Vienna, has taught that under favorable circumstances, with thin abdominal walls and large vagina, tubercular disease of the tubes can be felt from the vagina or rectum as irregular tumors, externally to the uterus. Also we can say from our own more extended experience, that under favorable circumstances the tubes can, by bi-manual examination, be very plainly mapped out; but in other extensive disease, as chronic catarrh, the canal will be found distended and its walls thickened so that the diagnosis of tuberculosis of the tubes is more or less uncertain. It seems possible that by examining the uterine secretion, and finding the tubercular bacillus, that the diagnosis can be made positive.

Carcinoma.—Cancer of the tubes rarely developes primarily, but is usually secondary to carcinoma of the uterus, ovary or peritoneum. Scanzoni saw a colloid cancer, the size of the fist, of the right ovary with cancerous deposit in the left tube, which was enlarged to the size of the thumb.

The tubes are often found hardened similarly to those in tuberculosis, the size of the finger and markedly degenerated, and are adherent to the similarly diseased neighboring organs, which together form an agglutinated mass; often they are contained in the diseased mass, but still are found to be in a normal condition. By tearing up the cancerous mass, parts of the tube will be found affected. As the disease advances the tubes play a most important part, even though carcinoma originates in the neighboring organs. There are no certain symptoms of this disease, and on that account its diagnosis is uncertain. Very rarely can a degenerated tumor of the tube burst and empty its cancer contents into the abdominal cavity. Kiwisch saw a case of this kind that ended in fatal peritonitis. Likewise death occurred in Scanzoni's famous case, after bursting of a softened carcinoma of the ovary.

CHAPTER II.

EXTRA-UTERINE PREGNANCY.

SINCE this affection, especially during its early stages, can be mistaken for many others of the pelvic organs, it is necessary to carefully consider it.

In this treatise I have, with permission, made use of the preparations that were presented to the Vienna Pathological Museum, up to the year 1879, and which have been much enriched by Professor Heschel, and by making drawings of the preparations I have been able to sketch the early stages of the affection. I extend my thanks to Professors Hofmann and Kundrat, and to prosector Weichselbaum, who left preparations in my charge. The drawings were made by Dr. Heitzmann.

The Formation and Divisions of Extra-uterine Pregnancy.—The ovule can be reached by spermatozoa in any part of the pelvic peritoneal cavity of animals, on its travels from the ovary to its normal developing place, the uterus, for instance, on every part of the way, on the fimbriæ, in the tubes, in the interstitial parts of the same and perhaps also in the ovary itself, as well as in the abdominal cavity, and in a rudimentary horn of the uterus. This unfortunate occurrence, for such it must still be called, since we do not possess positive knowledge as to the cause of these conditions, is described as "pregnancy exterior to the uterus, extra-uterine pregnancy, graviditas extra-uterina."

According to the place on which the ovum remains, and according to that organ with which it is found adherent, or in which it is developed, the different forms of extra-uterine pregnancy are designated.

Only when an extra-uterine deposited ovule is examined early in its development can the exact starting-point be determined, and that is usually found to be one or the other tube, interstitial part of the same, or in the rudimentary horn of the uterus.

The museum preparations and our researches only consist of tubal pregnancies, interstitial pregnancy, and pregnancy in the rudimentary horn of the uterus.

The youngest egg is that of Rogers, the size of an almond (Hennig). According to the site of the ovum in the tube, we may distinguish simple tubal pregnancy, tubo-uterine or interstitial pregnancy, and tubo-abdominal pregnancy. When the tubes are found to be entirely unaffected by the development of the ovum, the varieties are distinguished according to the starting-point that they are supposed to have in the pelvic cavity, as ovarian or abdominal pregnancies.

Although we can find no preparations of ovarian pregnancy, and on that account are doubtful of its existence, we will still mention what the views are in regard to it.

TUBAL PREGNANCY.

This is the commonest described variety of extra-uterine pregnancy; out of sixteen preparations in the Vienna Pathological Museum, there are nine with tubal pregnancy, and about two-thirds of the reported cases are described as being of this variety. Hennig found, out of 122 carefully analyzed cases, the seat of the egg to be seventy-seven times in the central part of the tube, and in the remainder of the cases the situation was found to be:

10 times near the uterus
17 " about in the middle
5 " in the outer third
5 " in the outer quarter.

If the impregnated egg remains in any part of the tube, the uterine mucous membrane changes, and the tubal mucous membrane becomes increased, surrounds the egg, forms a decidua, and a placenta is developed similarly to that in intra-uterine pregnancy. The early changes of the mucous membrane, and the formation of the decidua of tubal pregnancy have been thoroughly described by Rokitansky. According to him the decidua is formed as follows: The tubal mucous membrane becomes softened, covered with numerous elevations and depressions, which anastomose together and form an areolar layer, which with its depressions receive the villi of the chorion. Until a placenta is formed they are very loosely fastened together. These ideas of Rokitansky are quoted by Langhaus, Leopold, Hennig and others, who have further continued the description. Langhaus says that the changes of the structure of the tubal wall are, strictly speaking, the actual formation of a decidua, which is only completely formed at the placental site. Leopold found that the entire tube, by means of the chorion, was adherent to the ovum, and is so situated that the placental site becomes adherent to the tubal wall, so that from without inward, next to the serosa, is a single muscular layer one twenty-fifth of an inch in thickness, which contains blood cavities through its entire structure. Here a chorion is immediately formed, without the regular mucous membrane divisions, into decidua serotina; it is covered with epithelium, which is very vascular. The villi on that account, in general, lie loosely next to the muscularis; but occasionally some are firmly adherent by their expanded extremity to the inner muscular layer,

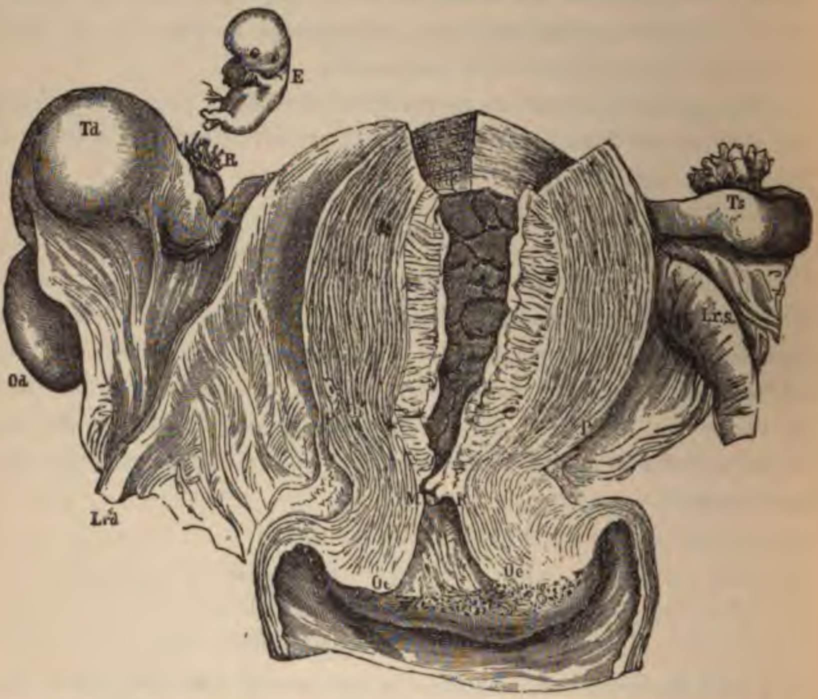

FIG. 9.—TUBAL PREGNANCY AT THE END OF THE SECOND MONTH. (About half size.) A 41-year old multipara died in a few hours after bursting of the tube. *Td*, right tube with the rupture R and the embryo *E*; *Od*, *Lrd*, right ovary and round ligament; *Ts*, *Lrs*, left tube and round ligament; *PP*, places where the peritoneum and uterus become adherent; *Oi*, the internal os, according to Braun's drawing from section of a frozen cadaver; *Mr*, Müllers internal os; *Oe*, external os; *Mr*, a decidua quarter of an inch in thickness. Evidences of inflammation were found on the cervix, parametrium and pelvic peritoneum.

and are surrounded by vessels, even as in the case of the normal serotina. Recently Hennig noticed that the villi of the chorion are taken into the follicles of the mucous membrane, and in regard to the decidua reflexa he states that on the thicker parts of the decidua tubæ, the layers are separated.

The uterine opening of the pregnant tube is occasionally open, and its decidua extends to the mucous membrane of the uterus; usually an extra-uterine ovum is shut off from the uterus. Generally tubal pregnancy causes in the beginning no symptoms, and as a rule it is of short duration; it bursts early through the thinnest part of the tubal wall, or at the placental site, and death is caused by internal hemorrhage, or the resulting acute peritonitis.

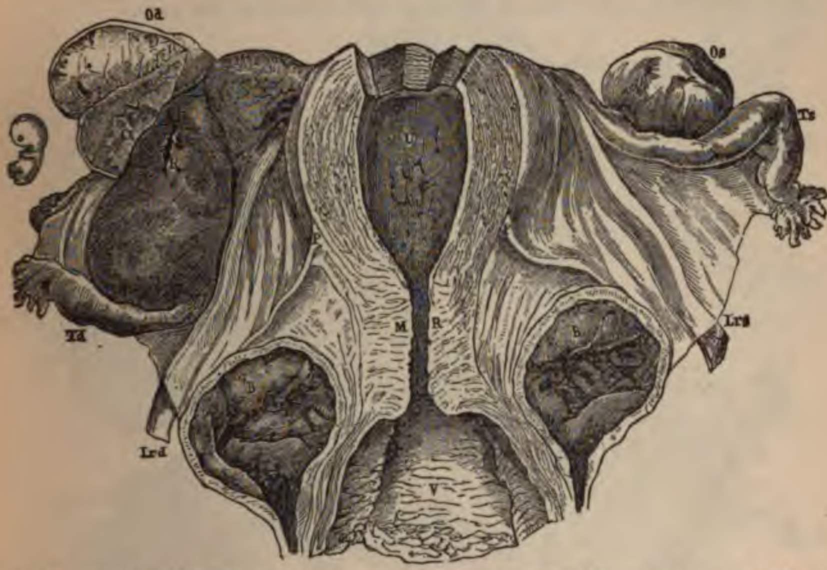

FIG. 10.—TUBAL PREGNANCY TOWARD THE END OF THE SECOND MONTH. Necropsy by Prof. Kundrat. Patient 26 years old. Third pregnancy. During life no symptoms of pregnancy, regular period just past. Died 6 hours after rupture of the tube. Rather normal cervix. Corpus luteum in the right ovary. No decidua. Lettering the same as in Fig. 9. (Personal case, half size.)

Hecker found that rupture took place in 45 collected cases, 26 times during the first two months, 11 times in the third, 7 times in the fourth, and once in the fifth month.

Among the preparations of the Vienna Pathological Museum, was one rupture of a Fallopian tube the size of a hazel nut, one the size of a pigeon's egg, three the size of a hen's egg, one the size of a goose-egg;

in the balance of the tubal pregnancies, there were three with mature fœtuses, but owing to the false membranes surrounding the fœtal sac, it is impossible to positively diagnosticate the original situation of the ovum. When an ovum is situated in the outer portion of the tube, it seems as though its duration is shorter, and this is proved by one of Spiegelberg's cases, in which the egg-sac was situated between the layers of the broad ligament, and its walls were strengthened by hyperplasia of the muscular layer of the latter. Recently Litzmann has again drawn attention to this condition, and has stated that such a development of the ovum is of frequent occurrence, and to it is due the contractility of the sacs.

INTERSTITIAL PREGNANCY: TUBO-UTERINE

We understand by this form of tubal pregnancy, that the ovum is developed in the interstitial part of the tube. Only one preparation in the Vienna Museum shows this variety of pregnancy, not far advanced; a nut-sized ovum is situated in the interstitial portion of the right tube, and

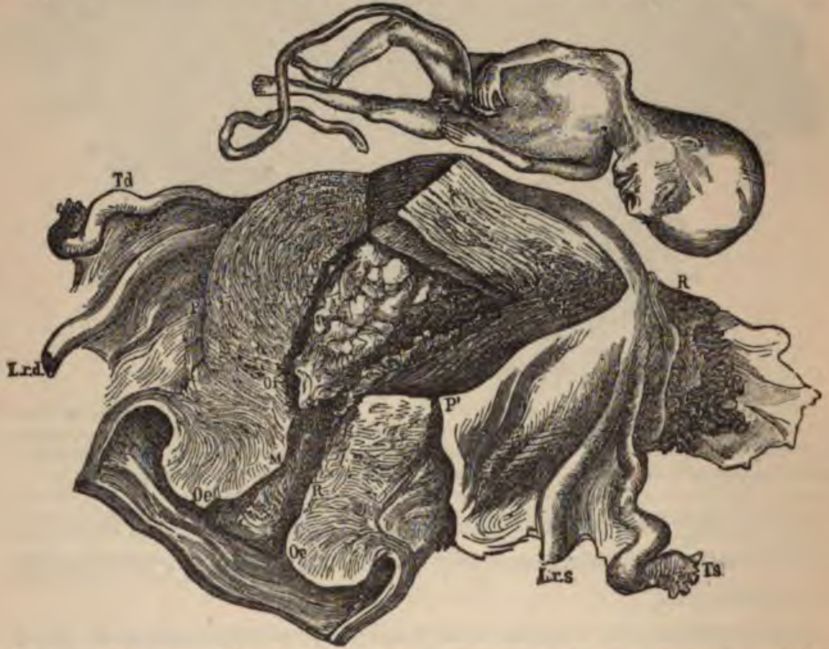

FIG. 11.—INTERSTITIAL PREGNANCY AT THE END OF THE FOURTH MONTH. (Reduced one half.) Necropsy by Prof. Hofmann. Aet. 37. Multipara; was during the evening suddenly attacked with vomiting and died towards morning. Above *oi* is the thick decidua. (Lettering the same as in Fig. 9.) Evidences of inflammation in the cervix and parametrium are predominant.

presses downwards towards the neighboring external uterine wall; another preparation shows a large thick-walled sac developed from an interstitial pregnancy. Klob also described a case. In this last case pregnancy existed for sixteen months, and the over-developed fœtus, although it had been dead for a long time, was removed by gastrotomy.

After carefully examining a large amount of collected material, it seems that this variety of pregnancy is of very rare occurrence, and that the cases are more common where an ovum in the interstitial portion of the tube developes so as to include the surroundings.

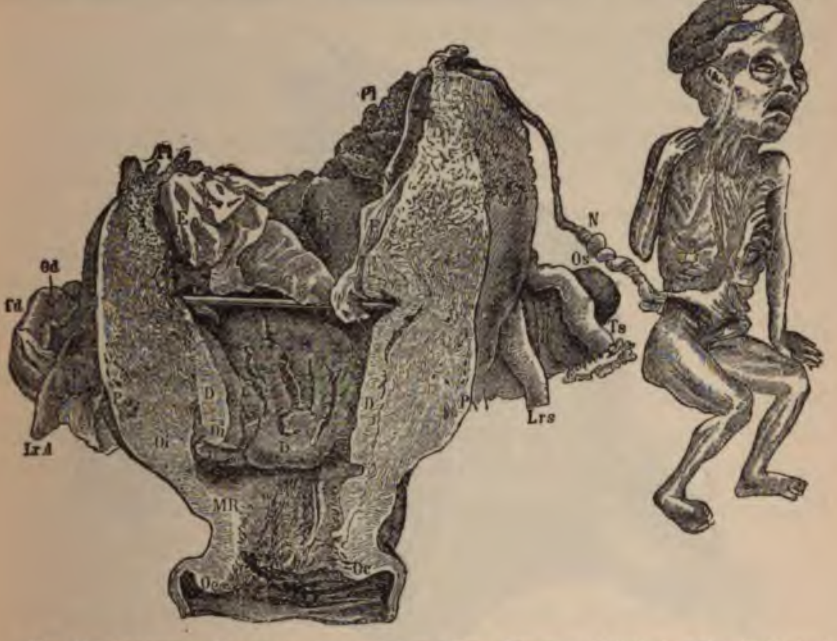

FIG. 12.—GRAVIDITAS UTERO-INTERSTITIALIS OVER FOUR MONTHS. (A little less than half size.) *Pl*, *Pl*, placenta; *E E E*, membranes; *Os*, *Ts*, *Lrs*, left tube, ovary and round ligament; *Od*, *Td*, *Lrd*, right tube, ovary and round ligament; *PP*, point where the peritoneum is reflected on the uterus; *Oi*, frozen section of the internal os, according to Braun's drawing, that is, internal os of the muscular structure; *MR*, Müller's internal os, that is, internal os of the mucous membrane; *DDD*, decidua corp. uteri (one-third inch); *Oi*, in the decidua (internal os of the decidua); *d*, decidua cervicalis (a line); *Oe*, external os.

J. Baart de la Faille has collected the cases described in literature as interstitial pregnancy, and we take from him the following statements, that according to Hohl, Busch and Czihak, Mauriceau in 1869 said that the uterus developed only on one side, the wall became thin, and in the third month of pregnancy it ruptured; Breschet, in 1826, wrote a mono-

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graph on this variety of pregnancy. J. Baart de la Faille, after a careful examination of twenty-four cases in literature, found that seventeen were interstitial pregnancies.

Hecker collected twenty-six marked cases of extra-uterine pregnancy. Since this time cases have been published by Birnbaum, Poppel, Braxton Hicks, Leopold and others.

If an impregnated ovum remains in the interstitial portion of the tube, which, according to Luschka, has a diameter of hardly a line and only a length of about seven lines, it may develop in any direction, but usually upwards; therefore the ostium uterinum can remain intact, or become dilated by the developing ovmu, so that in its further growth it may extend into the uterus or its walls, or externally to the organ; and there result such interesting varieties as tubo-interstitial or utero-interstitial, the names given to them by E. Klebs.

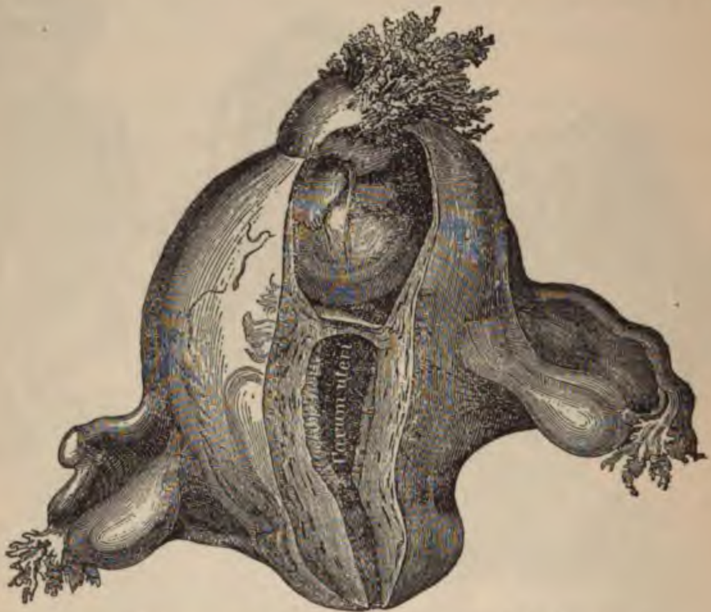

FIG. 13.—INTERSTITIAL PREGNANCY. (After *Hennig* from *Birnbaum*.)

In the collection of Rudolf's hospital I have found a very interesting preparation of this variety (Fig. 12). In the records it is described as follows:

In the left horn of the uterus, immediately within the left tube, is situated an ovum nearly the size of a child's head; the placenta protrudes from the outer uterine surface, and the amnion and chorion are plainly seen projecting into the uterine cavity. The left tube in the neighborhood of the ovum is closed, otherwise it is pervious. In the left ovum is a pea-sized corpus luteum. In the uterus there is a decidua about ½ a line in thickness. Fœtus four months old.

This and similar preparations explain the remarkable fact that the placenta can be delivered and the fœtus escape into the abdominal cavity or *vice versa,* and that before or at the time of rupture of the ovum profuse external hemorrhage can take place, as has recently been described by Leopold. As this treatise was passing through the press Maschka described a remarkable case of this kind. An interstitial pregnancy sac ruptured at the eighteenth week, and the girl died. At the necropsy it was found that the ovum had ruptured both into the abdominal and uterine cavities; the placenta and head of the fœtus with a part of the neck was in the abdominal cavity, and the body was found in the girl's room. According to the development of the ovum, in relation to the muscular substance, the sooner or later will it rupture.

In the cases that J. Baart de la Faille mentioned, pregnancy lasted once six, eight and sixteen weeks, six times ten and twelve weeks, three times longer than sixteen weeks; in Figs. 11 and 12 the cases lasted four months. According to this, tubo-uterine pregnancy generally ends fatally before the fourth month.

The villi of the chorion are attached to the deeper longitudinal and transverse layers of the mucous membrane of the interstitial portion of the tube, or push their way between the muscular fibres of the uterus itself (Birnbaum); or when one or more larger veins of the lacunar system are situated near the point of rupture of the ovum, the villi may penetrate their walls so that a cotyledon of the existing placenta is formed apparently within a vessel. According to Hennig this is the reason why the interstitial pregnancy rupture occurs into the uterus at the placental site.

TUBO-ABDOMINAL PREGNANCY.

Extra-uterine gestation is so named when the ovum develops in the outer portion of the tube, the membranes often remaining. By further growth they become surrounded by a part of the tube and by false membranes, which separate the ovum sac from the surrounding abdominal organs. The fringed extremity with the dilated end of the tube becomes more or less extended, and the markedly lengthened fimbriæ, strengthened by false membrane and by the layers of the broad ligament, end in the cavity of the ovum. The tubal wall often does not follow the developing ovum, but becomes thinned, and bursts at one or another point, at which place inflammatory exudations occur; and occasionally the effused blood forms a secondary capsule for the ovum.

Localized peritonitis and the resulting inflammatory products cause adhesions of the outer covering of the ovum with the neighboring structures, broad ligaments, ovaries, omentum, intestine, bladder, and uterus. Also by constant formation of false membranes and repeated rupture of the same, in the gradual development of the ovum, it becomes adherent to distant organs, spleen, kidney, liver. The placenta is usually found in the pelvic portion of the abdominal cavity.

Occasionally the tube and the ovary share to the same extent in the formation of the outer covering of the ovum; and from becoming imbedded in false membrane, and flattened out in the ovum cavity, there may remain no trace of the ovaries, and it may not be possible to determine with certainty the starting-point of the development of the ovum. In these cases we also speak of a "graviditas tubo-ovarica." This gradual pathologico-anatomical formation of the outer covering of the ovum explains why pregnancy lasts longer in these cases, even occasionally to term, or the child may be carried beyond the normal time. Four preparations of the Vienna Pathological Museum seemed to belong to this form of extra-uterine pregnancy: No. 2767 in the catalogue, marked right tubo-ovarian pregnancy, ended in death after the fifth month; in No. 1351, the tubal opening was lost in the sac of the ovum and only traces of the ovum itself existed, death occurred at the seventh month; in Nos. 2291 and 1103, the tubes ended on the ovum sacs, the fœtuses of which were carried thirteen and sixteen month

The first two instances, on account of their early unfortunate termination, hardly allow extended observation, unless in the form where the ovum has developed on the end of the fimbriæ. When it has reached a certain size it sinks down in the pelvis behind the uterus, gives rise to numerous early troubles and causes the woman to seek the physician or clinic. Of six cases which we have had the opportunity to see, three at the clinic of Prof. Braun, three elsewhere, five belonged to this variety of pregnancy; and of these two were operated upon at the fifth and seventh month respectively. One terminated at the seventh month, one in the second month, and one at term (fatal).

OVARIAN PREGNANCY.

We apply this term to that form where the ovum is developed in the ovary, and the tubes at the outset are not involved

For a long time this variety of pregnancy was declared impossible by many authors—as, for instance, Velpeau and Max Mayer, a student of Bischoff's. The latter was entirely opposed to the idea of ovarian pregnancy, because for the impregnation of the ovule it appears necessary that an unobstructed contact of the spermatozoa with the ovule should take place, and because a mucous membrane of peculiar structure and rich in vessels is a necessary accompaniment to development, and because, further, the reported cases of so-called ovarian pregnancy are lacking in sufficient anatomical data. He found a preparation described by Sömmering as "graviditas in ovario sinistro," but on close examination proved it to be tubal pregnancy. Mayer claimed a similar origin for all abdominal pregnancies; also Kiwisch held, in his day, that ovarian pregnancy could not be accounted for.

Ovarian pregnancy has always had its opponents, as William Campbell, and also later authors have considered its existence unproved. Of the well-known cases of ovarian pregnancy Spiegelberg found only nine that he could be sure of. One case that he himself described as ovarian pregnancy lacked in the first place the requisite ovaries; 2, ovarian elements were found in the ovum sac; 3, the ovum sac was connected with the uterus by the ovarian ligament; 4, the tube appeared the same as in larger ovarian cysts. Lately Vulliet and Beaucamp have written of cases where pregnancy occurred, according to the first in a tubo-ovarian cyst, according to the latter in a tube that was adherent to the ovary. Landau has described and illustrated a case where the ovum was situated on the inner surface of the ovary. The starting-point of all these cases might have been at the abdominal end of the tube. The supposed early varieties of ovarian pregnancy were described by Patenko and Hildrek Cambridge.

We are of the opinion that the origin of ovarian pregnancy is easily accounted for—that after the bursting of a follicle the ovule does not escape, but remains in the ovary, by some cause becomes impregnated, and is prevented from following its proper course. Schröder believes that when an impregnated ovum remains in the Graafian follicle it may develop in two ways.

If the Graafian follicle remains open the developing ovum may grow through the laceration, and while the situation of the ovum changes the placental point remains ovarian. P. M. Walter has described a case of this variety of development, and the same was anatomically explained by Bidder. A tumor six inches long, four wide and three thick was situated on the lengthened and thickened ligament of the ovary, which on its posterior surface had a flat surface that extended from a cavity on the surface of the ovum, ragged pieces were located on the edge of the latter and extended into the abdominal cavity. The remaining upper portion of the tumor consisted of thick unorganized fibrous material upon which was a sharply defined placenta-like structure, on cutting which a large amount of blood escaped. The substance of the ovary was entirely taken up by this formation, and consisted of a net-work, the cavities of which were filled with blood and villi of the chorion. The tube with its fimbriæ on the same side was normal in appearance. Prof. Kundrat made a necropsy on a remarkable case of cure in which the sac of a four months' ovum burst, and the embryo continued to develop in the free abdominal cavity, and the case will later be described under the head of secondary abdominal pregnancy.

The second variety of development is where the rupture of a Graafian follicle takes place over an impregnated ovum, followed by closure and continued development of the same within the ovary. The same occurrences take place around a developing ovum, as in the formation of an ovarian cyst. Some consider it possible for an ovule to become impregnated without rupture of the Graafian follicle, as it is doubtless possible for spermatozoa to pass through the thinned wall of the follicles.

Since early instances of development of this variety of pregnancy do not exist, and by advanced growth the relation of the ovaries to the developing ovum is not easily made out on account of adhesions with the surroundings, especially with one or the other tube, so in many cases we fall back on the ideas of Klob, who considered cases belonging to this variety as instances where all parts of the ovum-sac had entirely escaped from the ovary, and also where parts of the tube remained in its construction.

J. Hess wrote of a marked case of this variety that occurred in Gusserow's clinic, which terminated fatally at the end of the seventh month of pregnancy. The ovisac formed a round tumor nine inches in diameter, similar to an ovarian cyst, the upper surface of which contained large venous vessels, the cyst itself being attached by broad adhesions to the broad ligaments, intestine and abdominal wall; the last third of the tube on the same side was lost in the adhesions of the cyst; the remainder of the ovaries could not be found. The walls of the cyst were ⅛ of an inch in thickness, composed of conglomerate tissue, the cavities of which were filled with villi of the chorion. Exteriorly there was a placenta-like covering, containing large vessels, which was easily removed; internally was the chorion and amnion; on the thinner portion, where the three last layers alone were found, the villi of the chorion projected into the veins of the outer layer.

It is very difficult in advanced extra-uterine pregnancy to determine from which point the development of the ovum takes place; and in only one preparation in the Vienna Pathological Museum, No. 2124, do we find the statement that the ovum probably developed in the right ovary. It concerned a seven months' ovum-sac on which the right tube is spread out and in which portions of the right ovary could be detected.

ABDOMINAL PREGNANCY.

If an ovum falls from a Graafian follicle or from the smaller fimbriæ of the ovary into the abdominal cavity, and is or becomes impregnated and continues to develop, abdominal pregnancy is produced. In opposition to this idea is that in all of the described cases of abdominal pregnancy no early symptoms are known, so that they might have originated as tubal pregnancies. In our observations on our own described cases of abdominal pregnancy we must admit that the ovum began its development on the abdominal end of the tube. The fact that the placenta is occasionally found low in the pelvis speaks against this idea; but on the other hand, occasionally, in cases of large ovarian tumors, the tube is found lengthened and adherent so that the abdominal end is often as high as the navel.

According to Klob the ovum develops from the point where it is in contact with the abdominal wall, where cell proliferation of the connective tissue partly surrounds it, which through extraordinary vascularity makes it possible for a placenta to develop.

In rare cases the ovum is developed in the abdominal cavity without the formation of a pseudo-membranous sac, and there are many cases described where after the abdominal cavity is opened a developed fœtus is found to be covered only with a thin transparent membrane.

Usually there are inflammatory processes in the neighborhood; false membranes form and must by further development rupture again and again, and new ones form. Thereby the ovisac at times becomes as thick as a pregnant uterus. The walls of the sacs are mostly composed of new-formed connective tissue, which becomes adherent with the intestine, mesentery and rectum.

Hohl found in the walls of such a sac, that weighed 2½ pounds, fibrillæ that were not entirely cylindrical, but contracted when acetic acid was applied, and which he considered to correspond to the transverse fibres of the uterus; also indistinct organic muscular fibres were found on the posterior wall of the sac next to the uterus.

According to our opinion tubo-abdominal pregnancy is most favorable for advanced development, as by the formation of pseudo-membranes the neighboring structures become adherent to the sac, and prevent profuse bleeding, which is especially liable to occur in cases of tubal and interstitial pregnancy, where, after a certain size is reached, the outer covering, rich in blood-vessels, ruptures and death usually follows. In this variety the fœtus usually reaches complete development, and is very often carried beyond the time of normal pregnancy.

PREGNANCY IN A RUDIMENTARY HORN OF THE UTERUS.

This forms the connecting link between intra-uterine and extra-uterine pregnancy. Rokitansky thought that he had described the only case of this variety in 1842, and ten years later Scanzoni thought that he had described the second case, but Kussmaul, in his classical treatise, stated that many cases that had been described as tubal pregnancy were in reality pregnancy in the neighboring rudimentary horn.

The cases of Pfeffinger and Fritze 1779, of Friedemann and Czihak 1824, Jörg and Guntz 1831, Drejer 1835, Ingleby 1834, Heifelder 1835, were considered to be pregnancy of the Fallopian tube. Further cases were described by Rokitansky in 1842, (which was at that time considered to be pregnancy in the Fallopian tube, but Rokitansky declared it, in his pathological anatomy, to be pregnancy in a rudimentary horn of the uterus,) by Scanzoni 1854, (who at first considered it to be pregnancy in the Fallopian tube until he was shown his error by Virchow,) Behse 1852, Ramsbotham 1822. Two cases seem to have been correctly observed at a still earlier date, one by Dionis 1681, and the other by Camestrini 1788, to which may be added a later case by Luschka, 1863. Sänger has collected all of the cases up to 1884, and with the later cases of Chiari 1876, C. Ruge 1878, Maschka 1882, and his own, he finds twenty-nine cases, so that with one described in Fig. 14 there are altogether thirty cases of this variety of disease. Twenty-three ended in rupture during the first six months, three resulted in calcareous formations. In four cases laparotomy was performed.

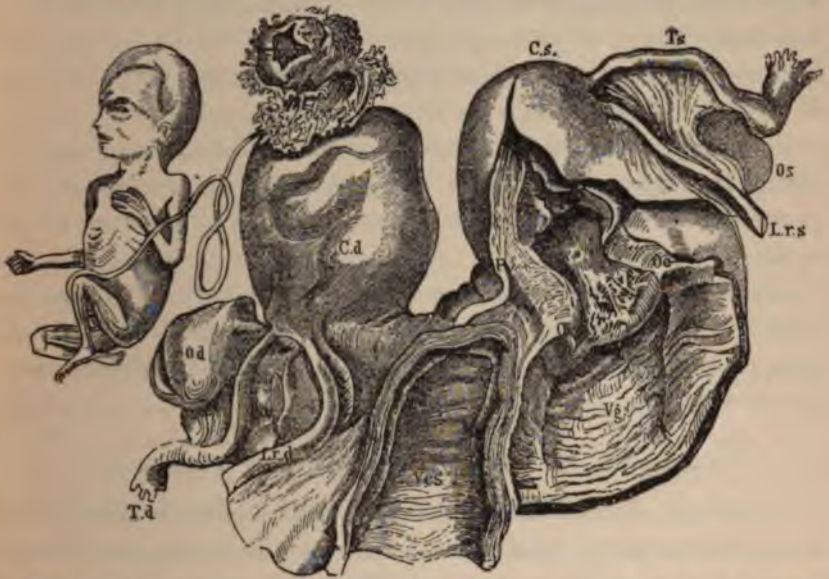

FIG. 14.—PREGNANCY AT THE MIDDLE OF THE FOURTH MONTH IN A RUDIMENTARY HORN, WHICH WAS SHUT OFF FROM THE VAGINA. Necropsy by Prof. Hofmann. (Half-size.) 19-year old girl died 6 hours after rupture of the sack. During life she was thought to be pregnant and abortion was attempted. *Cd*, right impregnated and ruptured horn; *Od*, *Td*.' *Lrd*, right ovary, tube and round ligament; *Cs*, left horn; *Os*, *Ts*, *Lrs*, left ovary, tube and round ligament; *Ves*, bladder; *Vg*, Vagina; *P*, point of attachment of the peritoneum, from thence upwards decidua; *Oe*, external os.

The differentiation of interstitial pregnancy and development in a rudimentary horn is often very difficult on the cadaver, since in both varieties the round ligament, which ought to differentiate between the two, lies outwards. According to Virchow great difficulty is frequently experienced in the explanation of a case as to whether it is pregnancy in a slightly developed accessory horn of a bicornate uterus or "graviditas interstitialis herniosa," in which case one has to bear in mind the location of the interstitial part of the tube and the part of the uterus to which the lateral ligament is attached.

These pathologico-anatomical observations ought to prove to the practitioner that the diagnosis of this variety of extra-uterine pregnancy may be impossible.

I received a very good preparation to illustrate this variety through the kindness of Prof. Hofmann; but unfortunately could learn very little of its history; although the rudimentary horn had no opening into the vagina, impregnation had taken place, very likely by wandering of the spermatozoa. A marked corpus luteum could not be found on the cut surface of the ovar

The cases are very rare where an extra-uterine ovum develops in a hernial sac. In one of Widerstein-Genth's reported cases, a four-months' fœtus was taken from an inguinal hernia that previously contained an ovary.

Changes in the Uterus in Extra-Uterine Pregnancy.

It is an old observation that the walls of the uterus are developed as in normal pregnancy. Friedländer, Kundrat and Engelmann have studied the development of the mucous membrane of the uterus during normal pregnancy; Ercolani and Langhaus the development of the uterus and its mucous membrane during extra-uterine pregnancy, and found the processes to be entirely analogous. Langhaus found on examining a uterus, the right tube of which contained a six weeks' ovum, that it was 3.8 inches long, two inches of which was body one inch thick, from the uterine attachment of one tube to the other 2.4 inches; in the cervix a tough plug of mucus was found. The changes in the uterine mucous membrane were the same as in the uterus in normal pregnancy at the fourteenth week, which Langhaus also examined.

In both cases it was found that swelling of the mucous membrane of the uterus took place, with extensive cell proliferation in the superficial part of the stroma, while in the deeper portion of the same the glands were markedly developed, giving a soft feel. Taking into consideration the stroma and glands, three layers can be distinguished in the mucosa; an upper compact, the original decidua; a middle spongy layer, rich in glands; and a deeper compact in which blind ends of the glands can be found. The layers were as markedly defined as in a normal case; the spongy layer was fully developed only in the middle of the anterior and posterior walls of the corpus uteri; in the remaining portions the glands were slightly developed, as were the middle and deep layers.

These changes in the uterus caused by extra-uterine pregnancy, which naturally extend to the cervix as well, especially its increased size and decidua, are of great practical value in forming a diagnosis in case of a doubtful pelvic tumor.

The uterus may be of varying size, and it may be stated that the nearer an extra-uterine ovum is developed to it, the more regularly will the uterus participate in development.

In interstitial pregnancy the uterus is from four to seven inches in length, from two to six inches in breadth, in thickness of its walls from ⅜ to 1⅛ inches; the wall is thickest on the impregnated side.

In tubal pregnancy development of the uterus does not regularly follow, and we quote Hennig who says, that in six cases the uterus was the same as it would be in unimpregnated women, and two of the cases were in young girls. Generally Hennig found the uterus enlarged; seven times slightly enlarged, eighteen times positively increased, five times double and once three times its normal size. He describes it as usually smaller than in interstitial pregnancy.

In tubo-abdominal pregnancy the uterus follows the same course, but not to the same extent as in interstitial and tubal pregnancies, and is usually found as it would be in the third or fourth month of pregnancy.

Ordinarily the form of the uterus is similar to normal. With the development of the organ the cervix becomes decidedly increased, and this we have observed in two cases.

Fig. 15 represents a section of a uterus of a seven months' tubo-abdominal pregnancy. The uterus is five inches long, 3⅕ inches in breadth, the walls of the body ½ to ⅘ inches in thickness. From the point of attachment of the peritoneum *p p′* downwards, the wall suddenly becomes thinner, and at the os externum it is ⅜ of an inch. The length of the thin-walled portion was two inches. The inner surface from *a a′* to *b b′* is 1⅝ inches in length and covered by a thin decidua; the cervical mucous membrane begins with a very sharp edge at *b b′*. We have convinced ourselves, by the examination of a number of virgin uteri, that the upper edge of the cervical mucous membrane is opposite the point of attachment of the peritoneum to the uterus, so it must be that that part of the uterus from *a a′* to *b b′* is the first to develop in early pregnancy. In this way we explain the changes in the cervix noticed in women that have been pregnant a number of times. Under these circumstances the ovum may find its point of attachment as low as *b b′*. If this is the case, the greater portion of the uterus which we, in the unimpregnated condition of the organ, describe as the cervix, is during early pregnancy drawn into that portion of the uterus which contains the ovum. We wish to emphasize the fact that these facts hold only for the large proportion of multiparæ (*vide* Fig. 12).

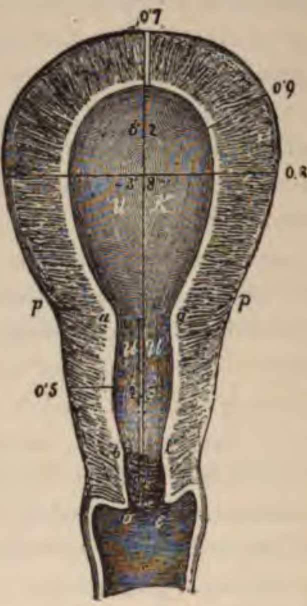

FIG. 15.—SECTION OF A UTERUS IN TUBO-ABDOMINAL PREGNANCY AT THE SEVENTH MONTH. (Reduced one half.) *Uk*, body of the uterus; *UU*, part of the cervix that is taken up during normal pregnancy; *pp*, point of attachment of the peritoneum; *aa′*, os internum according to the section on the frozen cadaver, from Braun's drawings (muscular os internum); *bb′*, Müller's os internum (os internum of mucous membrane); *oc*, ostium externum; *Ll*, broad ligament.

In three other cases of tubo-abdominal pregnancy we found the uterus 4½, and five and six inches long.

The position of the uterus varies greatly according to the locality of the ovum. It is usually between the third and fourth months, when extra-uterine pregnancy gives rise to severe symptoms, that the cases seek medical assistance, and then the ovum has sunk down in Douglas's *cul-de-sac;* the uterus is pushed up and more or less to one side, so that often we can feel its contour through the abdominal wall. So it was in two cases which we had the opportunity to observe in Professor Karl. Braun's clinic. In one case the vaginal portion was closely pressed against the symphysis, in another case it was pushed above the symphysis and difficult to reach; the same was present in two other instances which we examined. By further development the ovum, providing it has not contracted too extensive adhesions, will rise out of the pelvic cavity; and the uterus, which formerly held a high position, later becomes sunken below the edge of the ovum, or the ovum from the beginning is situated at a point where it will not sink into Douglas's *cul-de-sac.* In a case where pregnancy had gone to term we found the uterus, as is frequently the case in larger ovarian cysts, anteverted and somewhat to one side.

Symptoms of Extra-uterine Pregnancy.—At the beginning, as a rule, extra-uterine pregnancy manifests itself only by intra-uterine symptoms. Usually the women do not doubt that they have conceived, and consider themselves normally pregnant. Sometimes, during the early months, they have no idea that they are pregnant; such was the case represented in Fig. 10.

As for the symptoms peculiar to early pregnancy, they manifest themselves but slightly in case of ectopic gestation. As soon as the uterus becomes developed to any extent, however, hyperæmia and swelling of the vaginal portion appear. In cases where pregnancy is more advanced the vagina assumes usually the hyperæmic condition.

The mammæ as a rule swell less, and do not contain as much colostrum as in normal pregnancy. Hennig explains this by saying that the irritation proceeding from the genitals to the sympathetic mammary nerves is not as great in a normal location of the ovum. In a few cases the mammæ have shrunk on the occurrence of death of the ovum, and the process of milk formation has been checked. There is no doubt that during extra-uterine pregnancy, the sympathetic connection between the genitals and the mammæ expresses itself, but not to the same extent as in uterine pregnancy.

Menstruation does not stop so regularly at the beginning of conception as in normal pregnancy. Later it reappears; in three cases which we ourselves observed, it appeared twice after a pause of two months; once it remained absent, and once it remained regular. According to Hennig, menstruation again appeared in thirteen women, in six once, three twice, two nine times. Occasionally the flow of blood loses its menstrual character and becomes continuous; instances are reported where large quantities of blood have been lost from four to thirteen weeks. Profuse hemorrhage, as described by Leopold, rarely exists in interstitial pregnancy, although Leopold has described an instance where it was necessary to tampon the vagina. It is also not uncommon for a watery discharge to appear, which is easily accounted for by the formation of a decidua in the uterus. It is noteworthy that after the death of the ovum, when there is no unfavorable reaction, menstruation returns. The other symptoms of pregnancy may also be present, and the cases are not rare where they appear with unusual violence, and cause great suffering. The symptoms in the breasts and the menstrual phenomena frequently occur in normal pregnancy, however, and therefore will hardly cause the patient or the physician to rightly appreciate them.

Only when the extra-uterine ovum bursts, or reaches an appreciable size, are alarming symptoms produced, which cause the physician to make an examination and ascertain the condition of the patient. Rupture of the ovisac can occur at any time during the abnormal pregnancy, without special symptoms, and as we have already seen, in some women it occurs early and in others late. The symptoms are those of general internal hemorrhage. Gaping, drowsiness, collapse, fainting, cold sweat, frequent small pulse, at times vomiting, accompany the anæmic appearance. As a rule the woman is aware that she is in a dangerous condition, which may prove fatal. In Hennig's collection twelve times the sensation of rupture was distinct, in one woman it was noticed at two different times, fourteen times it was a sudden pain, oftener the collapse was so sudden that the summoned physician arrived only in time to find the patient in an unconscious condition, or practically dead.

In a case with which I am familiar, a lady who had been well, complaining simply of dragging sensations in her abdomen, in the evening was troubled with nausea, and before her physician could reach her she was dead. At the *post-mortem* a large amount of blood was found in the abdominal cavity, and a ruptured tubal cyst with a four months' fœtus.

In a case which I saw myself, a lady who had not in the least suspected her condition, went out to make some purchases, and in a few hours was seized with such pain that her friends had to take her home. When I saw her at ten o'clock, she was anemic, with closed eyes, cold hands, feet and face, spoke with difficulty, gaped considerably, complained of severe pain in the lower part of the abdomen, and at times was unconscious, the pulse was very weak, or at times could not be felt. I positively made the diagnosis of extra-uterine pregnancy, with bursting of the ovisac, and agreed with the family physician, Dr. Genser, that laparotomy in this instance was not advisable; the woman lived until two o'clock in the morning.

The severe symptoms of pain and anæmia may disappear, and on the death of the ovum not return. The symptoms, however, may recur at longer or shorter intervals, peritonitis may result, and the case after awhile terminate in death or recovery.

The blood in case of rupture of the ovisac may form a hematocele behind or to one side of the uterus, and undergoes the same changes as will be described later on.

In case early rupture of the sac, with fatal termination—as is usually the case in tubal pregnancy, of which we have seen and diagnosticated a number of instances—does not occur, then at the third to fourth month, pressure symptoms are caused, even as in case of tumors of other nature, when they have attained the same size. These are the more marked the deeper the position of the ovisac, and the more the uterus is pressed upwards, or to one or another side.

The most prominent symptoms are due to pressure on the bladder and rectum. Compression of the urethra results in difficult micturition, and later there may be atony of the bladder, as sometimes occurs in retroflexion of the gravid uterus; pressure on the rectum causes constipation, at times so severe that the woman is unable to have a passage without enemata.

Later in the development, added to the pressure symptoms, are inflammatory troubles, which are caused by successive ruptures and blood extravasations and the reformation of pseudo-membranes. From time to time pains occur in the abdomen, usually in the neighborhood of the developing ovum, accompanied by recurring febrile symptoms and tympanites, which often cause the woman to remain in bed during her abnormal pregnancy, until finally a fatal or favorable termination occurs.

In addition to the above symptoms of stretching and pressure, appear others from the side of the uterus. This organ, which goes through the same development as in pregnancy, and in which a decidua is usually formed, endeavors from time to time to discharge its contents, and this is the explanation of the watery discharges and pieces of decidua. The contractions of the organ in the beginning are not marked, and cause but little pain; they increase, however, generally after an irregular manner, and towards the end of the gestation they assume the character of true labor pains. In two women we have seen the pains so severe that it was necessary to apply an abdominal compress. These pains last for days, and are often the beginning of a favorable or fatal end, the latter being more frequent, and being due to rupture of the sac or to peritonitis.

If the ovum developes above the pelvic inlet, as occurred in one of our own cases, the pressure-symptoms are usually absent, and there are cases described where the fully developed fœtus was found covered only by decidua, there being no pseudo-membrane; the inflammatory symptoms may be absent, and the abnormal pregnancy in rare instances can progress to full term, or even longer without causing special symptoms.

Termination of Extra-uterine Pregnancy.—Not all extra-uterine pregnancies lead to death, but a very small percentage run a favorable course. In literature there are recorded a large number of cases where the fœtus either died in the ovisac, or where after rupture it was carried in the abdominal cavity for a number of years, until it finally caused death, or the patient succumbed to some other disease.

Recovery may ensue in case there is only rupture of the outer layers, when either the ovum degenerates or the fœtus dies, forming a so-called mole, as G. Blasius found even in a tube. Inflammation of or hemorrhage from the decidua, or lack of development of the villi of the chorion, will retard the development of the fœtus, or when developed prevents its further growth; the fœtus mummified becomes calcified within the intact sac.

Though the kindness of Professor Heschl I received a remarkable preparation of this variety, No. 3315 in the catalogue of the Vienna Pathological Museum, which was not contained in Rokitansky's collection, or described by any other writer. It came from a thirty-five year old woman who died from heart disease. The outer half of the right tube was swollen, and contained a bloody, slimy liquid, and in its cavity was a round hazel-nut-sized body, which was attached by tender threads from the villi of the chorion to the tubal wall. In the left ovary was a nut-sized cyst.

A second preparation, No. 2282, showed a hazel-nut-sized lithopedion in the right unruptured tube, which was found in a thirty-eight year old woman who died of apoplexy.

Duverney also described a case where an unruptured tube contained a three months dead embryo. (Hennig.)

Recovery may ensue when rupture of the ovisac has taken place, and its entire contents or only the fœtus escapes into the abdominal cavity. By inflammatory processes it becomes encapsulated, and sooner or later becomes shrivelled, and eventually may be calcified.

Leopold has obtained much information regarding the fate of the young fœtus by very interesting experimental work. He found that very young rabbits placed in the abdominal cavity were slowly invaded by white corpuscles, and entirely absorbed, while in older ones the soft parts were absorbed and small pieces of bone remained.

The conditions under which the fœtus is often remarkably preserved are not altogether positive. According to Albers the fœtus becomes pseudo-membranous, and connected with the vessels of organic life in the adjacent peritoneum, which necessarily leads to metamorphosis. The most famous lithopædion is the "stone child" of Leinzell, recently described by Kieser, which was due to rupture of the uterus of Anna Müller in 1674, and the child was carried until her death, at the age of ninety-four in the year 1720. Virchow and Wagner have described cases in which the fœtus became connected with the maternal circulation through false membranes, and in one case was carried twenty-nine years, and in another thirty-two years. In 1876 Professor Hans Chiari found two cases of lithopædion in rapid succession, which he plainly demonstrated and described before the physicians of the society of Vienna. The first case was one of extra-uterine pregnancy, and the lithopædion was carried fifty years.

The woman was aged eighty-two years, and died June 9th, 1876, from pneumonia, in the Vienna general hospital.

During life a hard tumor was noticed in the abdomen, and it was apparently connected with the uterus. The patient said that she was pregnant during the latter part of 1827, but was not delivered of her child, and as there was no pain she did not consult a physician.

A tumor the size of a man's head could be felt in the lower part of the abdomen. The left side was very much depressed, while the right protruded. The abdominal wall could easily be lifted from the tumor, and the latter could be moved over the vertebral column. *Post mortem* the tumor was found in the left iliac ossa. It was ovoid, seven by six inches, with its longest diameter parallel with the psoas muscle; the lower pole was in contact with the left wall and fundus of the uterus, the larger part of its front surface was adherent to the under surface of the omentum. The uterus was five inches long (its cervix two inches, its corpus three inches), its left horn was adherent to and seemed drawn out towards the tumor. The right tube and ovary were normal. The left tube was adherent to the anterior surface of the tumor, five inches long, and could be sounded with a fine probe. It ended blind at the site of adhesion of the great omentum with the tumor. The left ovary could not be found. The left ligamentum teres was adherent to the lower pole, and drawn out by the same.

The outer portion presented a number of bony hard points (carbonate and phosphate of lime), between which indentations could be made with the finger.

After sawing the tumor longitudinally, it was found to contain a somewhat shrunken fœtus at about the ninth month of development. The head formed the lower pole with its face to the right, and was somewhat deformed by pressure from the knees. The external genitals, remains of scrotum and penis, could be distinguished. The umbilical cord was the size of the little finger, and passed between the lower extremities over the face to the lower pole of the tumor, where with the aid of a microscope, it was plainly seen to be inserted into a placenta. The placenta as usual was attached to the decidua which surrounds the fœtus.

The decidua at places was tightly stretched over the fœtus, and adherent to the amnion. Such adhesion also included the left upper extremity. By these adhesions the decidua formed a fibrous membrane, one-fifth of an inch in thickness, which contained calcareous concretions.

All of the internal organs were markedly shrunken, but still plainly showed their normal form, excepting the brain, which was compressed between the depressed cranial bones, and was changed into a thick, reddish mass.

The cartilage and bone were normal. All of the other structures were hardened and darkened, as were Wharton's jelly and the placenta. There was a white detritus in the arteries, veins, heart and internal cavities of the body. There was a thin layer of material similar to vernix caseosa, covering the fœtus, excepting where it was adherent to the decidua.

On microscopical examination, all of the internal organs were found shrunken, but their different anatomical structures could plainly be seen. Fine needle-shaped crystals, of unknown composition, were found scattered through the body.

The original location of the ovum is unknown.

In the second case Professor Chiari found a lithopædion in a woman sixty years of age, who died from heart disease. It came from a gravidity in the partially developed left horn of the uterus; the fœtus was in the fourth month, shrunken, adherent in Douglas's *cul-de-sac*, and was carried by the woman without trouble for from fifteen to twenty years.

Pfeffinger and Fritze described a similar termination of pregnancy in a rudimentary horn of the uterus. The fœtus remained in the rudimentary uterine horn for thirty years. Rokitansky found a similar preparation that showed this termination, 1873, and presented it to the museum (No. 3253) with the following description: "In fundo excavationis recto-vaginalis feminæ 58 annorum, legaliter sectæ, locatum lithopædium, volumine ovum gallinaceum accedens, pseudo-membranis involutum. Uterus unicornis dexter, ex cujus margine sinistro 1″ intra ejus apicem exit propago 2—2½″ longa fine libero tumidula, solida, tubam cum ovario (3 m. gerens). In ipso hoc extremo tumidulo supra tubæ insertionem deprehenditur conspicua cicatrix."

Very often the tissue alterations are more serious than they were in the above cases. Then we find a shapeless mass composed of fat, lime salts, cholesterin, and pigment; the whole forming a more or less moist mass in the midst of which the fœtal skeleton will be found in a varying state of preservation (Klob). Kirrhonosis of the fœtus, a yellow pigmentation first noticed by Lobstein in the serous membranes and the spinal cord, and more recently recognized by Virchow as a general change, is of interest in this connection. Kieser found a citron or golden-yellow pigment in all the tissues of Leinzell's lithopædion.

In still another way the process may end in recovery. At any time during the pregnancy, most commonly near its middle, inflammation of the fœtal envelopes may occur, and adhesions to neighboring organs, to the rectum, vagina, bladder and uterus, ending in abscess formation, and piecemeal elimination of the foreign body.

In this category belong in all probability the cases which Ebersbach, in 1774, and Morlani and Josephi, in 1803, have described as *graviditas vesicalis*. In the latter case the product of conception is said to have remained fifteen years in the bladder. Thompson, in 1863, removed from the bladder, arms, legs, pelvic and cephalic bones by cystotomy; and the woman got well. Two remarkable cases of *graviditas stomachica* have been recorded by Salmuth, in 1605, and Maroldus, in 1670.

But even with so comparatively favorable a termination, a lithopædion may eventually cause the death of its bearer. To Professor Heschl I am indebted for the following history, belonging to preparation No. 1974 in the Pathological Museum at Gratz. A woman became pregnant in 1864, and Dr. Possi of Gratz diagnosticated extra-uterine pregnancy. It ended in the formation of a lithopædion. The woman subsequently became pregnant three times, and since the stony mass greatly diminished the pelvic cavity, Dr. Possi three times induced premature labor. In 1872 the woman died, after a peritonitis, and the opening of an abscess into the rectum. At the autopsy Heschl found an adherent tumor the size of a man's head between bladder and rectum, inside of which he discovered a well-developed fœtus.

Interstitial pregnancies may terminate in very surprising ways. Thus if the placenta is developed towards the uterus, the fœtus being well in the tubal cavity, the former may be born and the latter fall into the peritoneal sac, there, if it does not cause the mother's death, to undergo the usual changes.

We once had occasion to examine a woman who had become very sick at a time when she imagined herself to be five months pregnant. The placenta she gave birth to was, according to several physicians, the placenta of a five-months' pregnancy. The midwife, after waiting several hours for the fœtus, tore the cord. In the fossa recto-uterinum we subsequently found a tumor in which, by vaginal and rectal touch, we could plainly distinguish the head and limbs. It was the encapsulated fœtus. The exact contrary has also occurred, the fœtus being born and the placenta encapsulated in the tube or abdomen. (See Fig. 12.)

Secondary Abdominal Pregnancy.

Those extra-uterine pregnancies in which the fœtal sac bursts, and the woman not only survives, but the fœtus, nourished by a placenta implanted in its usual site, continues its development in the abdominal cavity, are of great interest. Patuna and Walter have recorded such a case; and we ourselves have during life diagnosticated a case as one of extra-uterine pregnancy, and extracted an asphyxiated child by laparotomy, after the woman's death. The necropsy showed that the ovum had originally grown at the abdominal end of the tube; at the fourth month rupture had occurred, and the placenta remaining where it was, the fœtus had established a second cavity for itself in the abdomen. The case is a peculiar one, and we will give its history briefly.

C. M., thirty-five years old, three children, entered the Lying-in Institute November 20th, 1871. She was the first of the pregnant women that I examined. She looked thin and suffering, and told us that five years before she had an eight-pound child, and two and a half years ago one weighing seven pounds four ounces. Both were normal deliveries. At the beginning of April she menstruated for the last time, but lost much less blood than was usual. No hemorrhage since then. For the first two months of pregnancy she was well, but since then she has continually been suffering. At the third month abdominal pain began; she lost flesh and strength, and has been in the Rudolf's hospital most of the time since then.

I found the abdomen distended to the size of full term. Its largest diameter, taken two inches above the umbilicus, was fifty inches. Over the entire abdomen the percussion note was flat, and fluctuation was distinct everywhere. The abdominal tumor was distinctly divided by a deep furrow running from below, and on the left side upwards and to the right. In the furrow, which included the upper two-thirds of the abdomen, the child, some six pounds in weight, could be felt lying transversely with its head to the left. The heart sounds were audible somewhat to the left of the ensiform cartilage, and the movements of the child left no doubt as to its being alive. There were no distinct upper boundaries to the tumor.

The lower tumor seemed to occupy the entire space between the crests of the ilia, and reached, as before said, two inches higher upon the right than upon the left side. It was elastic, especially to the right, and no fœtal parts could be detected in it. Nor could any be felt by vaginal touch. The vaginal portion of the cervix was drawn behind the symph. oss. pub.; the cervix was soft, the os open, and I could introduce two fingers deeply into the cavum uteri. I could feel no amniotic sac, nor could I make out that the cervical canal communicated with the upper cavity which contained the fœtus.

Bi-manual examination showed an elastic tumor about the size of one's head, lying upon the right ilium; the left side of the uterus appeared to be empty. Two days later the sound was used; it entered four inches, and to the left. By cautious movement towards the tumor at the right of the uterus, the sound was easily passed in 8.8 inches, so that its point could be distinctly felt in the region of the umbilicus. This somewhat clouded the diagnosis of extra-uterine pregnancy, since, if we were mistaken as to the nature of the tumor at the left of the uterus, the sound may simply have been passed into an ordinary pregnant uterus, or into the dilated cavity of a uterus bicornis or duplex, or there might be an intra-uterine as well as an extra-uterine pregnancy. At all events, we had to find out where the sound had gone to. We might have entered the tube, or perforated the uterus. This latter appeared quite probable. The uterine tumor which we felt might be the placenta, or, judging by its consistency, it might quite probably be an ovarian cyst. On November 29th the woman was again sounded in the presence of Professors Späth and G. Braun. The sound entered ten inches, and was felt as before. The index finger could easily be introduced into the uterine cavity, and the fundus pressed down from without upon it. The organ was empty; and there was not either in the right wall, nor in the cervix or vagina, any opening which might speak for duplexity of the uterus. The tumor upon the right side we determined was an ovarian cyst. A piece of decidua two and a half inches square was cast off during the examination. The examination decided the diagnosis in favor of extra-uterine pregnancy with a well-developed fœtus.

The woman was fairly well while in the institution, walking upstairs to the second story three hours after this last sounding. Laparotomy was refused.

On December 1st some more decidua came away with expulsive pains. Peritonitis set in, and the woman died December 3rd at noon. I extracted a living child by a regular laparotomy. The infant breathed three times, and died.

Next day Dr. Kundrat performed the *post mortem.* In the abdominal cavity were ninety ounces of a dirty serous fluid; but no membranes of the child (which weighed eight pounds) could be found. The omentum was adherent to the anterior abdominal wall, the peritoneum was injected and covered with fibrinous effusion. On lifting the small intestine we could see the secondary cavity, in which the fœtus had lived for many months. The anterior and lateral walls of this cavity were formed by the abdominal wall, which was covered with a pseudo-membranous effusion .2 inches thick. The posterior and upper walls were formed to a small extent by the posterior abdominal wall, but mostly by the intestines, large and small, which were matted together by pseudo-membranous plates and bands. The uterus lay to the left, and reached 3.2 inches above the pelvic brim. It was 5.2 inches long, and near the right tubal ostium showed the place where the sound had perforated. The left ovary was of normal size. The right, half as large, was attached, together with the right Fallopian tube, to a tumor six inches long, 4.8 inches broad, and four inches thick. This tumor lay mostly upon the right ilium, but projected into the pelvis. It was united to the posterior vaginal wall by dense adhesions, and contained the placenta. Its walls were dense, and two to three lines in thickness. Towards the uterus, at the level of the pelvic brim was a round hole one inch in diameter, the sharp border of which reminded one of the falsiform process of the fascia lata. Through it the umbilical cord passed to the placenta. Around the opening were the wrinkled brownish yellow remains of the decidua, evidently belonging to an earlier period of the pregnancy.

These cases are very rare; in most instances the fœtus dies at the moment of rupture, or soon after.

One termination of tubal pregnancy, which is interesting from an anatomical point of view, and does not appear to be so very rare, has been described by Kiwisch. As a rule the dilated tube ruptures towards the peritoneum. But in some cases it breaks along the attached border, and the fœtus gradually works its way into the layers of the broad ligament, and thus the fœtal envelopes are reinforced by a layer of muscular fibres. Loschge long ago described a similar case; Beaugrand mentions it (Klob), and Deceimeris called this pregnancy "Grossesse souspéritonée-pélvienne."

While at one side of the uterus an extra-uterine pregnancy is going on, the tube upon the other side may be patent, and a uterine as well as an extra-uterine pregnancy occur. Such cases do not seem to be of rare occurrence, and, according to Schröder, have been recorded by Gössmann, Pellischeck, Cook, Sager, Landon. Pollak, Argles, Rosshirt, Clarke, Pennefather. In the two latter cases the termination was favorable for the mother. Rosshirt removed, three days after the easy delivery of the intra-uterine child, the extra-uterine one by vaginal incision and the forceps. It was dead, and the mother perished from hemorrhage into the fœtal sac. H. P. C. Wilson removed an extra-uterine child by laparotomy twenty-five days after the natural delivery of an intra uterine one at term. An intra-uterine fœtus may also be removed by premature expulsion, while another continues its development in the abdomen.

After an extra-uterine pregnancy has terminated in the formation of a lithopædion, the woman may again become pregnant. She may have a normal childbirth, or the extra-uterine fœtus may form an obstacle to delivery, or the pregnancy may cause inflammation in the abdominal sac. Thus Anna Müller, the mother of the lithopædion of Leinzell, had two healthy children afterwards; and Hugenberger of Moscow did a Cæsarean section on account of the hindrance to delivery offered by the mass; and Dr. Possi of Gratz, three times procured abortion for the same cause. Barnes relates a case as follows: "A woman twenty-eight years old, who had had one child, became pregnant again. At the end of the ninth month pains set in; but they gradually relaxed, the swelling diminished, and a hard, painless tumor remained behind upon her right side. The woman conceived again, and bore a healthy child at term. The tumor seemed unaffected, but five days later high fever set in, with diarrhœa, pain in the tumor, and profuse, foul-smelling sweats. After nine weeks fluctuation was distinct in the tumor, it was opened, a large amount of foul-smelling pus came out, and a fully-developed fœtus was extracted through the wound. The placenta was cast off with suppuration, the woman suckled her child, and got well."

Similar cases of pregnancy after calcification of the fœtus have been recorded by Faber, Johnstohn, Day, Stolz, Terry, Hennigsen, Haderup and Greenhalgh (two cases). In Haderup's cases the bones of the extra-uterine fœtus were evacuated by the rectum, while the regular pregnancy ending in normal birth was going on.

Surgical interference can do something for these cases, and help elimination. We will return to this point under the head of Treatment.

The following lists of Kiwisch, Hecker and Hennig, will give some idea as to the relative frequency of these various modes of termination.

In Kiwisch's 100 unselected cases, *death resulted*

From hemorrhage, ...	in 49 cases.
" more or less acute peritonitis, . . .	" 17 "
" peritonitis after long retention of fœtus, .	" 4 . "
" perforation, ...	" 9 "
Recovery ensued:	
After spontaneous elimination, ...	in 7 cases.
" retention of fœtus, ...	" 8 "
" operation saving mother and child, . .	" 1 case.
" " " mother alone, . .	" 2 cases.
" " with death of both mother and child,	" 2 "

Thus in 100 cases 18 got well, 15 after spontaneous evacuation, 3 after operations. Total mortality 82 per cent.

In Hecker's 132 cases of abdominal pregnancy, *death resulted:*

From hectic, ...	in 18 cases.
" peritonitis, ...	" 12 "
" rupture and hemorrhage, . . .	" 7 "
After fæcal vomiting, ...	" 2 "
" diabetes, ...	" 1 case.
In undetermined ways, ...	" 4 cases.
After operations, ...	" 12 "
Recovery ensued:	
After evacuation of fœtus *per anum*, . .	in 28 cases.
" lithopædion-formation, ...	" 17 "
" evacuation through abdominal wall, .	" 15 "
" laparotomy, ...	" 11 "
" vaginal incision, ...	" 3 "
" indeterminate operations, . . .	" 2 "

In 132 cases, 76 cures; 62 spontaneously, 14 after operations. Death occurred in 44 cases out of 56 after a spontaneous course, and 12 times after instrumental interference. Total mortality 42 per cent.

According to Hennig's statistics, in 150 tubal pregnancies 17 recovered, of whom 11 were operated upon. The rest all died after a longer or shorter time. 127 died without and 6 after operation. Total mortality 88 per cent.

From these tables we can get some idea of the duration of the various kinds of abnormal pregnancies.

Month.	Interstitial.	Tubal.	Tubo-ovarian.	Tubo-abdominal.
I.	—	5	—	—
II.	4	22	—	—
III.	8	17	1	—
IV.	4	16	3	4
V.	4	8	—	—
VI.	2	1	—	—
VII.	—	1	—	—
VIII.	1	1	1	4
IX.	5	1	—	—
X.	7	2	3	4
Over Xth	2	—	—	1

It is worth noticing that in the cases left to themselves death occurred from internal hemorrhage after rupture of the oviduct in half of the 81 cases.

Death from hemorrhage after rupture of the tubal sac occurred:

After 1 hour in 3 gravid. tubæ.
" 2 " " 3 "
" 5 " " 3 "
" 10 " " 3 " and 3 interstit.
" 20 " " 7 "
" 40 " " 7 "
4 days after 2nd hemorrhage 1 "
7 " " " " 1 "
9 " " " " 1 gravid. tubo-ovarica.
11 " " " " 1 gravid. tubo-abdominalis.
6 weeks " " " 1 gravid. tubaria.

Although some of the cases may occur more than once in these various tables, yet they are of especial value, since each author regards the subject from one special point of view. Kiwisch groups all the cases of extra-uterine pregnancy together, without differentiating their special forms; and from his tables the practical physician may learn what he may expect when once he has diagnosticated the malady.

Hennig groups pure tubal and interstitial pregnancies together. More than half of these succumbed to internal hemorrhage during the first months; and the frequency of these cases teaches us how probably correct the diagnosis of extra-uterine pregnancy is when a woman who has had symptoms of pregnancy suddenly sickens or dies with the signs of internal hemorrhage.

Hecker collates mostly well advanced cases, probably largely tubo-ovarian; and we see that his lists give the best prognosis, 42 per cent. against 88 per cent. in Hennig's list.

Etiology.—Extra-uterine pregnancy is rare; we have examined 1000 female genitals *post mortem*, and have not found tubal pregnancy once. Statistics as to its frequency are, however, unreliable, since it is to a great extent the serious and complicated cases which are received in our large lying-in hospitals and clinics. During seven years in the three lying-in clinics, and the gynecological clinic of Professors Carl v. Braun and Späth in Vienna, among 60,000 cases, five cases of extra-uterine pregnancy were observed during life, and examined *post mortem*.

In regard to age it has been often noticed that extra-uterine pregnancy is less frequent in young than in old women. This is because the older women have borne children before, and frequently suffer from tubal catarrh; the ciliated epithelium is lost, and adhesions, constrictions, and bendings of the oviducts occur which interfere with the passage of the ovum.

Fritze (1779), Virchow and Hecker have especially studied the causes of the affection. The two former agree in regarding stricture of the oviduct from bands or adhesions, due to inflammation of the serosa of the pelvic organs, as the cause of the affection. The women were either entirely sterile until this abnormally situated pregnancy occurred, or they had not been pregnant for a long time subsequently to the birth of one or more children, and until extra-uterine pregnancy set in. (Hennig.) And extra-uterine gravidity is most common at the age when tubal diseases are most frequently seen.

Hennig's cases of interstitial and tubal pregnancies give us the following ages:

Up to 20 years, ...	2 times.
" 30 "	30 "
" 40 "	46 "
" 50 "	6 "
" 60 "	1 time.

Other changes besides stricture and bending of the tube may cause the faulty implantation of the ovum which we are considering. Closure of the uterine end of a tube; wandering of the sperms through a patent tube to the ovary belonging to a closed one; the presence of diverticula (which Carus supposed to be the cause of interstitial pregnancy); hernias of the mucosa of the tube, such as Klob has described—all these may lead to the occurrence of the accident. Nor must we omit to mention the exceptional occurrence of a branch of the tubal canal, arising in its interstitial portion, which Baudelocque, the nephew, has called bifurcation (see Fig. 16), and has claimed as a rare cause of *grossesse de la paroi de l'utérus* (Graviditas intramuralis.)

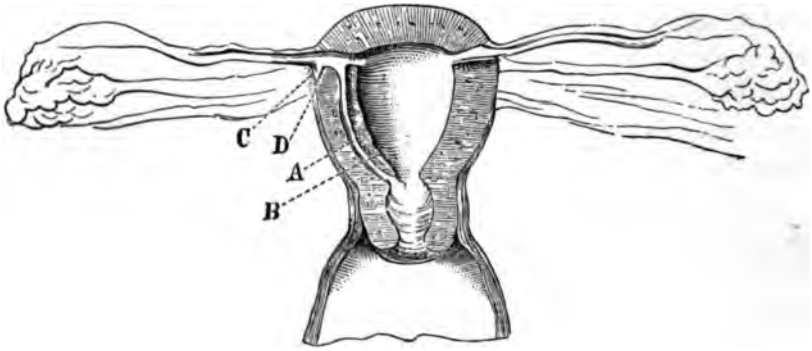

FIG. 16.—*A*, "Canal ouvert par ses deux extrémités paraissaut être la continuation ou plutôt une bifurcation de la trompe droit ;" *B*, inner layer of uterine substance ; *C*, outer pocket of the same oviduct ; *D*, middle uterine layer. (After *Hennig*.)

Hennig notes a malformation of the internal genitals which Köberlé saw, of a similar character; and he inclines to the opinion that they are fœtal residua, analogous to the Gärtner's canals found in many of the lower animals. We cannot doubt the possibility of this occurrence *a priori*: for there has been a case in which the ovum is to be seen implanted in the uterine substance, and it is difficult to understand how it gets there unless there is some anomaly of the interstitial portion of the tube.

Accessary tubes have been found by Rokitansky, and are worthy of mention. An ovum might get into the accessary tube, be arrested, and develop there.

Or the entrance of the ovum into the uterine cavity may be impeded. As in Beck's and in Leopold's cases, there may be small polypi in the uterine end of the tube, or fibromata so situated in the uterine substance as to compress the interstitial portion of the tube.

Finally, injuries might have occurred leading to a communication between the vagina or uterus and the abdominal cavity. In this class belong Schröder's two cases. One has been observed by Lecluyse, in which a women had formerly had Cæsarean section done on account of pelvic contraction, and who died from the laparotomy done for the subsequent abdominal pregnancy. An opening 1.6 inches long had remained in the Cæsarean incision, through which the uterine and abdominal cavities communicated. Köberlé saw a case in a woman whose uterus he had extirpated for a fibroid tumor. She conceived through a fistula left in the scar of the cervix, and died of the pregnancy that resulted. Similarly, a pregnancy may occur when an inverted uterus has been ablated. We have ourselves observed four weeks after amputation with the red-hot wire the abdominal cavity remaining open; and since the tubes lie in the scar, it is quite possible that one or other may remain patent, and an ovum be fructified, without the uterus, in the remaining portion of the tube, or in its neighborhood. And we may mention W. A. Freund's idea that a disturbance during a fruitful cohabitation might cause an extra-uterine pregnancy.

We must now mention that remarkable process which Bischoff first recognized in the bicornate uteri of certain mammals, and called *emigration of the ovum,* since it may lead to extra-uterine pregnancy. Eschricht, the Copenhagen anatomist, however, as long ago as 1832 noticed that sometimes he found the corpus luteum in the human female upon the side opposite to the fœtal sac (Kussmaul). Since that time several observers have seen it, and Kussmaul begins the introduction to his above-mentioned monograph in these words: "On December 14, 1857, I made the *post-mortem* examination of a young woman who had died suddenly from hemorrhage in consequence of the bursting of the sac of a tubal pregnancy. The relations of the corpus luteum were very remarkable. The conclusion seemed inevitable that the ovum which had developed in the left oviduct had come from the right ovary." Thus we have anatomical proof of a hitherto unknown origin of tubal pregnancy, and some light is cast upon the subject of the movements of the ovum.

It is clear from Kussmaul's thorough exposition of the subject that all ova originating from the ovary of one side may become imbedded in the opposite half of a simple uterine cavity; and further that an ovum may become implanted in a tube or in an atrophied cornu upon the opposite side, and may develop there. The ovum is supposed sometimes to take the route through the abdominal cavity, extra-uterine migration, and sometimes to pass through the uterus, intra-uterine migration. Observations of this kind from reliable sources become so numerous that C. Mayerhofer, in an essay "on the corpus luteum and the migration of the ovum" could collect seventeen cases of this kind.

In most of these cases the oviduct or a rudimentary horn of the uterus and one side contained the ovum, while the true corpus luteum was upon the ovary of the other side. If, as most believe, the true corpus luteum is always the point of origin of a fructified ovum, it is impossible to explain these cases upon any other supposition than that of migration.

But Mayrhofer objects entirely to the generally accepted theory as to the relations of the true corpus luteum to the ovary, and does not believe in the migration of the ovum. He does indeed admit that the true corpus luteum differs from the false corpus luteum, inasmuch as the former undergoes a much greater development, and becomes vascularized, while the latter does not. But he claims that there are exceptions, and that even in virgins we occasionally find corpora lutea which have all the characteristics of the true yellow body. Thus Mayrhofer claims that we cannot always distinguish the true from the false copora, and both Luschka and Bischoff hold that the character of the corpus luteum will not enable us to decide in doubtful cases. Mayrhofer then goes further, and denies the persistence of the corpus luteum through pregnancy, basing his opinion upon cases which died during pregnancy and shortly after delivery, and in which no corpus luteum was found, and in still greater degree upon those in whom fresh false corpora lutea were found *post mortem* at various stages of pregnancy. Thus he comes to the following conclusion: That the corpus luteum verum does not mark the point of origin of the impregnated ovum, but that it is formed during pregnancy, probably every four weeks.

If Mayrhofer's views are correct the entire theory of an ovular migration falls to the ground; the corpus luteum might be found upon either side, since it would belong not to the impregnated egg, but to some subsequent ovulation. We would only be forced to admit migration in those cases in which the ovary corresponding to the pregnant tube or uterine horn was entirely wanting; in which case Mayrhofer (there is but a single one, Weber's migration case No. XIII.) himself must admit it. But since even in this case the tube on the ovarian side was very short 2½ inches, while it was longer on the other side (4½ inches), Mayrhofer seems inclined to regard the anomaly as due rather to an adherence of the right tube to the left ovary than as due to ovular migration.

We ourselves agree in part with Mayrhofer's criticisms, since we have several times failed to find those regular changes in the corpus luteum which are described as characteristic of the various stages of pregnancy. We have often sought in vain for a true corpus luteum in women who had died during pregnancy or shortly after delivery. We cannot therefore regard it as absolutely settled that the finding of a so-called corpus luteum verum while the ovum has developed in a rudimentary horn of the uterus or the tube on the opposite side as proof positive of ovular migration.

Conrad, Langhaus and Leopold, do not agree with Mayrhofer, and regard the above cases as true examples of migration of the ovum.

Diagnosis.—There are no special symptoms which occur during the early development of an ovum implanted outside the uterus, and the physician will seldom be in a position to diagnosticate this dangerous occurrence early.

But under certain circumstances it does seem possible to recognize the condition positively and at an early stage. These are present when the abdominal walls are thin; when all the uterine signs of pregnancy are well marked; when the body of the uterus is not as large as it ought to be at that period; and when there is a large tumor in one or the other tube. Of course there might well be hydropsy of the tube; but if it chanced that we had examined the woman's genitals before, and could exclude such a tumor, we might, I think, succeed in diagnosing a tubal pregnancy at the third month. But interstitial pregnancies, and certain forms occurring in rudimentary uterine cornua could hardly be diagnosticated in their early stages.

Sudden and violent internal hemorrhage after previous good health in a pregnant woman, together with the passage of decidua, will warn us that extra-uterine pregnancy is present.

If the woman survive such an early rupture, the effused blood sometimes forms a tumor larger than the fœtal sac itself. This often renders the diagnosis almost or quite impossible between a simple hæmatocele and an early extra-uterine pregnancy.

But when the ovum has attained the size of the third or fourth month, and when the recurrent circumscribed peritonitides cause symptoms not usual in normal pregnancies, the physician may be led to suspect the existence of the malady in question.

But very careful and long-continued examinations with all the methods at our disposal will be necessary before this suspicion becomes a certainty. We will endeavor to sketch the development of such a diagnosis.

As soon as the suspicion is awakened that the woman may be suffering from extra-uterine pregnancy, we need, first, an exact anamnesis and exploration for our diagnosis. As usual this consists in determining the existence of pregnancy, and deciding upon the existence of a foreign tumor besides the uterus in the pelvis.

The woman will tell us that pregnancy has occurred. Absence of the menses and the usual nausea will be present; but we must not be misled by the subsequent appearance of bloody vaginal discharges. Swelling of the breasts, relaxation and hyperæmia of the genitals, and especially the swollen condition of the vaginal portion of the cervix as seen with the speculum; the enlargement and softening of the entire womb, as revealed by bi-manual examination; the softening of the cervix; all these will tell a practised observer that conception has occurred.

Once certain of this, and finding that the size of the uterus does not correspond to the supposed stage of pregnancy, we must search for a tumor near the womb. If we find it, it is a further starting-point in our diagnostic progress.

We have now to prove that the tumor in question contains the fœtus, and that the uterus is empty. For this purpose careful bi-manual palpation by vagina, rectum, and abdominal wall is to be undertaken, narcosis being employed, if necessary. This portion of the diagnosis is often extremely difficult; for the extra-uterine growth lies so close to the womb, is so little movable, and the uterus itself is so soft, that it is hard to tell whether the tumor does not belong to the uterus itself. But sometimes, when in a non-sensitive woman we have thin abdominal walls and a wide vagina, the diagnosis is not so difficult. Sometimes, on the other hand, it is almost impossible, and we will long remain in doubt as to whether we have an intra-uterine or an extra-uterine pregnancy to deal with.

As we have stated, the uterus may be displaced in various ways by the tumor; it may be raised, or depressed, or pressed to one or the other side; it is most easily demonstrated when the ovum is developing in Douglas's *cul-de-sac,* and the womb is pushed forwards and upwards.

The uterine sound may be used to ascertain the size of the viscus and the absence of the product of conception from its cavity. But it should only be employed when we already feel certain that the organ is empty, as otherwise it might easily lead to abortion. Nor must we lose sight of the softness of the uterine walls in extra-uterine pregnancy. As a rule bi-manual examination will give us more certain information than will the sound.

To decide whether the tumor near the uterus is the fœtus it will be necessary either to recognize its contents by palpation, or to hear the fœtal heart sounds. This also can probably be most readily accomplished when the ovum is developed in the abdominal end of the tube, and, having sunken into the cavum recto-uterinum, can be readily reached with the finger from vagina or rectum. We were able in this way to follow exactly in one case the development of the ovum from 3½ to over 4 months. Before the third month, even under these most favorable circumstances, the contents of the fist-sized tumor could not be recognized; we could only assert the probability of an extra-uterine pregnancy from the concomitant signs of gravidity. At first the lower periphery of the tumor lay somewhat lower than the ostium externum uteri, and pushed the posterior vaginal wall down and the uterus upwards and to the right. Both uterus and tumor were but little movable. A distinct furrow separated the one from the other, and by the beginning of the fourth month the tumor had the feeling of a cyst in which was a movable solid body. Towards the end of the fourth month we could plainly get ballottement from vagina and rectum. This rendered our diagnosis extremely probable, especially in conjunction with the other signs of pregnancy.

But other tumors may resemble a fœtal sac in all these respects, and the practitioner will do well not to make an absolute diagnosis of extra-uterine pregnancy until he can appreciate the certain signs of fœtal life, active movements, and the heart sounds. In the above case we heard the heart-beats two weeks later, and the woman began to feel life; and this rendered the diagnosis a positive one

Since in most cases which come under early observation the ovum has developed in the abdominal end of the tube and consequently remains, so long as its size permits, in greater or less part within the pelvic canal, it is probable that at the third and fourth month many cases will behave as in two which we observed. In these cases the fœtal sacs had fallen into Douglas's *cul-de-sac*, and had displaced the uterus forwards and upwards, just as a hæmatocele would have done. Since the uterus is often markedly laterally displaced also, we will probably be able to decide upon the side of the abnormal development. Thick abdominal walls will of course render bi-manual examination difficult; but if necessary a rectal examination may be used to enlighten us, always bearing in mind the fact that the sac enveloping such a fœtus is very delicate and may easily be ruptured by inconsiderate manipulation.

If the extra-uterine pregnancy lasts over the fourth month, the ovum will be as large as two fists. If now the abdominal parietes are not too thick, we may with care make out the contours of the fœtus by percussion and auscultation, and even feel its separate parts.

The further advanced the extra-uterine pregnancy, the less information can we obtain from rectal and vaginal examination as compared with abdominal palpation, since the product of conception lies higher the larger it gets. But through the abdominal walls we may then feel the contour of the child, appreciate its voluntary movements by touch and sight, and hear the fœtal heart-sounds. There are, of course, many exceptions to this. Thick abdominal wall, manifold adhesion of the fœtal envelopes, and the occasional thickness of the capsule of the ovum, may prevent accurate definition. But in all the cases that we have observed it was easy to make out all these points. Occasionally, even in advanced pregnancy, we may be able to appreciate per vaginam the fœtal head or the limbs.

Of course we are not justified in making a diagnosis of extra-uterine pregnancy simply from the fact that we can appreciate fœtal parts covered only by walls, and see their motions. This occurs not infrequently in ordinary pregnancies in badly-nourished women with thin uterine and abdominal walls. The mistake has, however, been made, and we must beware of being deceived. If under such circumstances we are in any doubt, we must prove either that the product of conception is surrounded by the uterine walls, or that the womb is empty. If external abdominal palpation is carefully made, especially with a cold hand, we may feel and see the thin uterine walls contract under the stimulus. An absence of this reaction, however, affords no basis for a conclusion. We must then endeavor to prove that the uterus is empty by a most careful bi-manual examination, if necessary, under chloroform. In advanced extra-uterine pregnancy the fœtal sac is often so intimately united to the womb by multiple adhesions that both masses seem to form one tumor, and the determination whether the gravidity is extra or intra-uterine is very difficult. In a doubtful case of this kind, when the extra-uterine fœtus had reached term, we succeeded after repeated examinations in passing the forefinger into the open cervix uteri and bringing out shreds of decidua, thus proving that the fœtus was not in the uterine cavity.

When we cannot arrive at certainty by means of bi-manual examination, we must rely upon the uterine sound, being mindful of the cautions before given. If a fœtus should be in the womb, we may be so unlucky as to produce abortion. Nor must we lose sight of the possibility of there being an extra- and intra-uterine pregnancy at one and the same time.

Another diagnostic point worthy of mention is the passage of portions of decidua, especially in advanced extra-uterine pregnancy, either with or without bearing-down pains. Of less value are certain other signs, such as the development of the arteries at the fundus vaginæ, the form of the fœtal sac, etc.

If we find great difficulty in the diagnosis of extra-uterine pregnancy while the product of conception is alive and growing, how much greater must it be when the fœtus is dead and the placenta alone develops for some time, or when one or other of the terminations above mentioned is in process? The certain signs of pregnancy are absent, and the contours of the fœtus are obscured by shrinkage, by neighboring exudations and pseudo-membranous masses. And if we recollect that various tumors, fibroids, and cystoid tumors may be of such shape as to simulate a head and limbs, we will understand in how many cases it is simply a guess to make a diagnosis of terminated extra-uterine pregnancy. An abdominal tumor in a woman can only be certainly pronounced an extra-uterine pregnancy which has terminated when we have ourselves watched the development of the living ovum, or when it has been seen by trustworthy medical witnesses. Women often make statements which would lead one to suppose that the case had been one of abdominal pregnancy when giving the history of their tumors; they say that the lump has become harder and smaller, that swelling of the breasts and other symptoms of pregnancy have diminished; and yet the tumors turn out to be of quite another kind.

We have ourselves seen a cystoid removed by Billroth by ovariotomy, in a woman where the formation of a lithopædion had been diagnosticated with great probability.

Thus the greatest caution is necessary in the diagnosis of a terminated extra-uterine pregnancy.

Prognosis and Treatment.—We appreciate the dangers from this affection from what has already been said. Out of Kiwisch's 100 cases, eighty-two, out of Hennig's 150 cases, 133, and out of Hecker's 132 cases, fifty-six died. But the last figure is far too favorable.

It also follows from the above statistics that more cases have been cured by unaided nature than by operative procedure. This is not surprising when we remember that most of these cases belong to a time when we were yet very much afraid of opening the abdominal cavity; and operative aid was only sought in isolated cases. It by no means follows that we must avoid attempts to cure the affection by operation. On the contrary, nowadays, when ovariotomy, when the removal by laparotomy of the largest uterine tumors, when Porro's ablation of the body of the uterus after Cæsarean section, when Freund and Czerny's total extirpation of the carcinomatous uterus, have given us cures bordering upon the marvellous, we must bend all our efforts to the operative cure of the affection we are considering. Already, I think, the percentage of cures after operation is greater than it was; probably largely on account of our immensely increased experience in abdominal operations.

Since the different phases of extra-uterine pregnancy require quite different treatments, it will be useful for us to divide the therapy into that of *a*, early pregnancy, *b*, advanced pregnancy, and *c*, terminated pregnancy.

a. *Treatment of Early Extra-Uterine Pregnancy.*

Hennig's collection of cases shows us very conclusively that the greatest danger to the life of the mother is, especially in interstitial and tubal pregnancy, during the first weeks and months, when rupture of the sac and fatal internal hemorrhage is so liable to occur.

Most women die a few hours or a few days after this occurs, and even if they survive the first hemorrhage, they succumb to the subsequent peritonitis. We must therefore make every effort to recognize the affection as early as possible, and begin appropriate therapeutic measures.

Laparotomy while the Fœtal Sac is entire.—The diagnosis positively made before rupture, we have the choice of two modes of procedure:

We may open the abdominal cavity and treat the extra-uterine ovum exactly according to the rules of ovariotomy; and there is no reason why we should not attain as good results as in that operation. Since, however, it is often impossible to decide upon the exact seat of an extra-uterine pregnancy, we might happen upon an interstitially located ovum, and have difficulties in the treatment of the pedicle. But similar and still greater difficulties occur in the treatment of large uterine fibromata, and are overcome; and they certainly can be overcome in these cases also.

But we will only rarely have occasion to do this operation in the early stages, before rupture has occurred. For not only is the diagnosis very difficult, but the women believe themselves pregnant in the ordinary way, and have no occasion to seek medical aid.

But sometimes the symptoms are so different that the physician has occasion to see the patient, and make the diagnosis; and for these cases the best and most rational operation is laparotomy and treatment of the sac according to the rules of ovariotomy and myomotomy. Judging by the anatomical preparations before us, most cases being tubal, the operation should be an easy one at an early period; thus the cases shown in Figs. 9 and 10 could have been removed with a few ligatures, and the lives of the women saved.

J. Veit has demonstrated the possibility of diagnosis and cure of tubal pregnancy at an early date. On February 22, 1884, he showed to the Obstetrical and Gynecological Society of Berlin a tubal pregnancy of three months duration, where he had performed laparotomy and easily removed the sac. The fœtus made repeated attempts at inspiration when its skin was irritated. On May 23, 1884, he showed a second tubal sac removed during life in the same way. Both women recovered easily. Lawson Tait, according to J. Veit, has only lost one out of seven early cases thus operated upon. In the discussion which followed, C. Schröder also pronounced himself in favor of an early operation in tubal pregnancy.

Laparotomy after Rupture of the Sac.—In most cases the rupture occurs suddenly and without warning; only after it has occurred is the physician called, and but too often does he stand at the bedside doubtful and hesitating. Compression of the aorta, which has been recommended, requires considerable muscular strength, and the presence of not too thick abdominal walls; the coagula are disturbed when the hands are changed as they must be, and the method is of but doubtful value. For the symptoms of internal hemorrhage we can only use the usual remedy, cold abdominal applications, clysters of ice-water, the introduction of small pieces of ice into the vagina, rest, wine, a few drops of oil of cinnamon and other stimulants. From the deep seat and size of the ruptured vessels it is difficult to conceive that cold exercises any influence upon the hemorrhage. The application of Esmarch's bandage to the extremities is also of doubtful value, since the more the blood is squeezed out of the extremities, the greater appears to be the hemorrhage from the ruptured vessels.

We agree with Kiwisch in the opinion that, since death can hardly be averted in any other way, it is proper to open the abdominal cavity and stop the hemorrhage directly.

For we have ourselves seen a man with a tubal sac which ruptured at the second month (Fig. 9), live four hours after laparotomy was first proposed, and in most of these cases death only occurs five or more hours after rupture.

This proposal of Kiwisch's was made at a time when the results of ovariotomy were by no means so favorable as they are to-day; and we can certainly remove from the peritoneal cavity such dangerous contents as blood, liquor amnii and fragments of tissue.

As to the manner of procedure we cannot do better than to reproduce Kiwisch's exact words: "In the first place the abdominal cavity must be freely opened (six to eight inches) with the usual precautions along the linea alba. The peritoneal incision might at first be made only a few lines in length, and by the introduction of a warm sound and careful pressure, a certainty of the presence of blood in the peritoneal cavity be obtained. If there is blood, the opening should be completed, and the pelvic contents made thoroughly accessible. Next we must find the bleeding point. The hand is to be introduced into the abdomen, and the uterus lifted up, and, if it is not itself the seat of an interstitial pregnancy, its appendages are to be carefully followed out on the side of the tumor. It may be necessary first to remove the effused blood. The rupture discovered, the ovum or its remains are to be at once extracted. If the ovum is already in the abdominal cavity, its removal may be deferred till later. In accordance with the structure of the seat of hemorrhage the bleeding point must be seized with a forceps and wholly or in part tied with long ligatures, or, if the edges of the wound need it, they must be united by a fine needle and moderately thick silk. If, as will most often probably be the case, this does not suffice to check the hemorrhage, we might in tubal cases extirpate the entire sac, using the same procedure as the ovariotomists do. After hemorrhage has entirely ceased we can proceed to thoroughly remove the effused blood by means of fine warmed sponges, and then replace the intestines and close the abdominal wound, passing the ends of the ligature out through it."

There is but little to add to these regulations of Kiwisch's. As in the modern ovariotomy operation, we will cut the ligatures off short and guard the woman against septic infection by the well-known precautions. The difficulty in the diagnosis and the fact that other affections, especially hæmatocele, often have very much the same symptoms of internal hemorrhage, will limit the applicability of the operation.

Attempts have already been made, however, to save a woman's life under these desperate circumstances. Bozeman reported to the Medical Society of New York on November 19, 1884, a case in which the symptoms of internal hemorrhage leading him to suspect the rupture of the sac of a tubal pregnancy, he quickly did a laparotomy, and extirpated the right ruptured tube. But he did not succeed in averting death. On May 8, 1885, C. Schröder presented a specimen to the Berlin Obstetrical and Gynecological Society where he did the same operation after the rupture of an extra-uterine sac at the third month. Fœtus and placenta lay in Douglas's *cul-de-sac*. The right uterine appendages, which were the seat of the ovum, and to which were adherent the omentum and the mesentery of the small intestine, were extirpated. The patient was very anæmic, and an unfavorable result was to be anticipated.

Our second method is to prevent the development of the ovum by puncturing the sac and evacuating the liquor amnii, or by injecting agents to destroy the fœtus, or by electricity.

Puncture of the Fœtal Sac.

Baudelocque and Querin proposed vaginal puncture, and Delisee and Kiner in 1818 carried it out. (J. Baart de la Faille.) Kiwisch gives the credit of first proposing it to Basedow, and recommends that while the abdominal walls are gently pressed downwards from without, the sac is to be punctured from the deepest place in the posterior vaginal wall with a long, curved trocar, and the liquor amnii evacuated.

Since that time the operation has been successfully performed several times. Greenhalgh has punctured at the beginning of the fourth month, and E. Martin at the fifth month through Douglas's *cul-de-sac*. In the latter case the fœtal bones were subsequently expelled per rectum. In Martin's second case, which was first seen at the end of the third month, the spindle-shaped tumor of the left tube was punctured in the same way through the posterior vaginal wall; and Stolz and Köberlé have successfully done it also.

There have been, however, unfortunate cases, and several observers of large experience warn us against puncture of the sac. The patients of Simpson and Braxton Hicks died, and so did a woman whose case we observed ourselves, and in which Carl v. Braun did the operation.

I admitted a woman thirty-eight years old to the clinic on June 20, 1871, with the suspicion that she was suffering from extra-uterine pregnancy. Three years previously she had had one normal birth; and on the 28th of February last she had last menstruated. About the middle of April she began to bleed, and this had continued to the present time with but short intervals. There had lately been considerable pain, for which morphine injections had been used. The pelvis was at first filled with an elastic painful tumor, the upper border of which could be distinctly felt above the pelvic inlet. During the seven weeks for which we observed the growth of the tumor, the uterus was crowded more and more upwards and to the front, so that finally the vaginal portion was

⅖ of an inch above the pubic arch. The cervix was voluminous, soft, and open; the finger could be passed 1¼ inches above the external os. The upper periphery of the tumor was now midway between symphysis and navel; the uterus could be both felt and seen through the abdominal walls. There was occasionally a little blood. The uterus, now sounded, was found to measure 4.4 inches. August 10th I obtained ballottement, and a few days later was able to hear the fœtal heart sounds; but the woman could feel no life.

The sac was punctured August 15, and over two pints of liquor amnii were evacuated through Douglas's *cul-de-sac*. The next day the woman had violent bearing-down pains, during which we could distinctly feel the uterus becoming harder and softer through the abdominal walls. Four days later there was fever and slight meteorism; on the 21st and 22nd chills with temperatures of 101° and 102°. The pains eventually became so bad that injections of morphine up to the 31st were required twice daily. The patients died with all the symptoms of peritonitis on September 7th. The autopsy revealed peritonitis; uterus empty, six inches in size; in the cavum recto-uterinum was a fœtal sac the size of a man's head, and covered with pseudo-membranes, which was adherent to the left tube and the atrophied ovary on either side. It contained a macerated fœtus of 5½ months.

Gaillard-Thomas, who has seen thirty cases of extra-uterine pregnancy, warns us not to puncture the sac; he has lost three women, he says, in whom he allowed himself to be persuaded to do the operation.

So that we cannot to-day recommend puncture of the sac. Rennert has shown that in some cases there occurs detachment of the placenta and hemorrhage into the fœtal sac; and the history of early laparotomy is already such as to lead us to prefer it to the operation in question.

The injection of narcotics into the fœtal sac has been once successfully done by Friedreich and Prof. Lange. A girl twenty-seven years' old had a hen's-egg-sized, smooth, rather immovable tumor lying to the right of the uterus and parallel with Poupart's ligament. It could be reached from the vagina; and since the menses remained absent and colostrum appeared in the left breast, it was decided that there very probably existed extra-uterine pregnancy. A Pravaz syringe was filled and with a long needle curved like a uterine sound Friedreich injected ⅒ grain of morphine into the sac four times. The tumor got smaller, and in four weeks only an irregular lump as large as a walnut was left. Joulin and Köberlé have also successfully done this operation (Hennig).

Recently Rennert has destroyed the fœtus at the fifth month of pregnancy in the same way. The vagina was disinfected with a 1 to 1000 sublimate solution, and fifteen drops of a 3 per. cent morphine solution, together with a little carbolic acid, was injected into the sac. Vesical paralysis and occasional pains and febrile attacks occurred for six weeks subsequently; but the fœtus was killed, and the mass atrophied.

Thus the destruction of the fœtus with morphine seems to be less dangerous than the complete and sudden evacuation of the liquor amnii; but whether it can compete with laparotomy only the future can tell us.

Destruction of the Fœtus by Electricity.—There have recently been many very favorable reports published regarding this method, especially by American specialists. The method has hardly been tried in Europe, and we are not yet in a position to say much about it.

Burci and bacchetti introduced two acupuncture needles into the tumor in question and then passed a current through the mass. Two cases are said to have been cured. According to Carl v. Braun, Cazeaux and Duchesne suggested in 1862 the killing of the fœtus by a strong discharge from a Leyden jar.

Favorable reports have appeared in the American literature of the last ten years from Lovering, Landis, Garrigues, Rockwell, P. Mundé, Bozeman, Thomas and others.[1]

b. *When the Pregnancy is far Advanced and the Child alive.*

If the child has attained viability, the dangers for the mother are increased. Labor pains set in, with peritonitis, detachment of the placenta and hemorrhage into the membranes, or rupture of the sac; and death follows in a longer or shorter time. In only a small minority of cases does the fœtus die and the pregnancy end in a cure. And the life of the child itself must now be a factor in our consideration.

Therefore many of the older physicians held that it was incumbent on us to deliver the living or even recently dead child by abdominal incision (laparotomy, gastrotomy), or by vaginal incision (kolpotomy, elytrotomy).

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[1] For adequate reference to the value of electricity in the treatment of early ectopic gestation, see Vols. II. and V., of this Cyclopedia.—Ed.

It is true that recorded cases were not very favorable to this mode of procedure. Thus Campbell states that out of nine women in whom gastrotomy was done while the fœtus was alive, or shortly after its death, not a single one survived. And since an occasional case that was not operated upon recovered, physicians recoiled from interference save only in those cases in which nature herself seemed to be endeavoring to eliminate the fœtus.

Kiwisch was the first to raise his voice against such indecision; he recommends extraction by the most appropriate method when the infant is at term, or near it. He claimed that we were only justified in temporizing so long as the pregnancy took its normal course; but insisted that as soon as disturbances occurred, and especially as soon as pains set in, an operation was indicated. Since the time that Kiwisch made these statements the results of abdominal incision have been so good that most obstetricians now incline to agree with him. Only recently Keller has collected ten cases, in which an operation was done while the child was alive, and Schröder adds to the list a recent case of Meadows. The results are not so unsatisfactory as those of Campbell. Four out of eleven mothers, and eight out of twelve children (one case of twins), were saved.

We may say to-day that operative procedure is more than justifiable so long as the child is alive.

C. Litzmann has recently collected twelve selected cases, in which laparotomy was done towards the end of the pregnancy, and while the child was living. Of ten mothers only one survived; and of the ten children four lived for some time, five died in the first twenty-four hours, and one after two days. Let us note that the births were premature in several of the latter cases.

In spite of these discouraging results, Litzmann approves, with certain reservations, of the operation while the child is alive. While Gusserow holds that the eight month of pregnancy is the appropriate time for operation, Litzmann would only do it at the tenth month, when the child appears to be well developed and strong, and if he feels moderately certain that the placenta is not inserted under the line of incision in the anterior wall of the sac.

Werth, a pupil of Litzmann, has collected seven additional cases, in one of which only (A. Martin) the mother's life was saved. For this reason, and because the results of laparotomy are far better after the fœtus is dead, Werth objected at the Copenhagen Congress of 1884 to any operation being undertaken for the purpose of saving the infant's life, and argued that we should rather await its death.

We ourselves think that since the life of mother and child have been saved, the operation is a proper one, and our efforts should be directed to improving the method of operation. Judging by the *post-mortem* findings in our own case, laparotomy and extirpation of the sac with the placenta would not have been difficult to accomplish.

As to the time of operation, Kiwisch long ago noticed the danger of waiting for expulsive pains, and no time should be so lost. We ourselves have seen the beginning of the pains mark the turning-point in the woman's fate; and we hold that operative interference should take place as soon as the end of the pregnancy appears to have been reached.

Our choice of operation depends upon the situation of the sac. In most advanced cases the greater part of the fœtus is above the pelvic brim; an abdominal incision is the most suitable procedure.

Laparotomy.—This operation is to be performed entirely according to the rules of ovariotomy. The linea alba marks the line of incision. The chief danger of the operation while the child is alive lies, as Litzmann has shown, in the relations of the placenta and the placental circulation. If the placenta is attached to the anterior sac wall, and we can hardly ascertain that until we have made the incision, a very serious hemorrhage will inevitably occur. In fact most of the cases operated upon have perished from this cause. We must either avoid this hemorrhage, or control it. And nowadays, when much greater technical difficulties in operations upon abdominal tumors and organs have been overcome, it is to be hoped that we will succeed in this also. We might puncture the ovum in another place, quickly enlarge the fœtal sac, and extract the child, after passing an elastic ligature around the placenta; or perhaps by enlarging the abdominal incision we might be able to open the sac at some other place; or we might after puncture push the placental vessels to one side, put an elastic ligature around them, open the sac, extract the child, and extirpate the whole membranous bag Already the entire sac has been extirpated successfully after the child has died and the placental circulation has ceased, by Litzmann, Billroth, Knowsley Thornton, and Schröder; and by many of these authorities the removal of the entire sac with the living child is regarded as a not entirely unfeasible operation.

If the placenta is implanted at the fundus or the opposite wall of the fœtal sac, as is most often the case, the technical difficulties are far less. Those cases in which the sac is so adherent to the anterior abdominal wall that the peritoneal cavity is not opened, are naturally the most favorable. It would probably then be correct to leave the sac undisturbed after extraction, tying the cord near the placental insertion, and treating the cavity as an abscess, close the upper part with sutures and put a drainage tube in its inferior angle. Schröder recommends vaginal drainage whenever the site of the placenta will permit it. If portions of the sac are not adherent to the abdominal wall it may be necessary, if entire extirpation is not accomplished, to suture the edges of the fragments into the abdominal wound. A. Martin once successfully closed the remaining portion of the sac with sutures after putting a drainage tube in the abdomen. W. A. Freund has recommended that the sac be filled with equal parts of tannin and salicylic acid so as to keep the placenta aseptic until it is cast off.

A. Ramsbotham told us long ago that no attempt should be made to remove the placenta. There is no contractile force in the tissue to which it is attached, and any such act will be followed by an alarming hemorrhage. A. Martin has once succeeded in surrounding the seat of insertion of the placenta with a ligature, and controlling the hemorrhage.

Subsequent to the operation we must take great care that no injurious secretions are allowed to collect, and that purulent remains of the embryo find free outlet through the abdominal wound. We will often have purulent collections, especially in Douglas's *cul-de-sac*. If possible they should be evacuated by puncture or incision.

Kolpotomy (*Elytrotomy*).—Several cases are known in which both mother and child have been saved after vaginal opening of the sac. Campbell remarks that the results therefrom are much more favorable to the mother than those of gastrotomy. In nine cases three were successful, both as regards mother and child; in two the mother only was saved; in one the child alone survived; and the three others terminated fatally for both mother and child.

Sometimes in advanced extra-uterine gestation a large segment of the ovum occupies the pelvic cavity, the head or buttock of the child depresses, softens, and thins out of the posterior vaginal vault, as in normal pregnancy. It is then probable that the fœtal sac is largely adherent to the walls of Douglas's pouch. Is it not proper in these unusual cases, to deliver by head or feet, after a vaginal incision? Gaillard Thomas reported on April 15th, 1884, to the New York Gynecological Society, that he found this condition of things three times in thirty cases; and he incised, and extracted the fœtal head with the forceps successfully. Thomas showed that if, as in case 17, pains set in and no artificial aid was rendered, the fœtus always died.

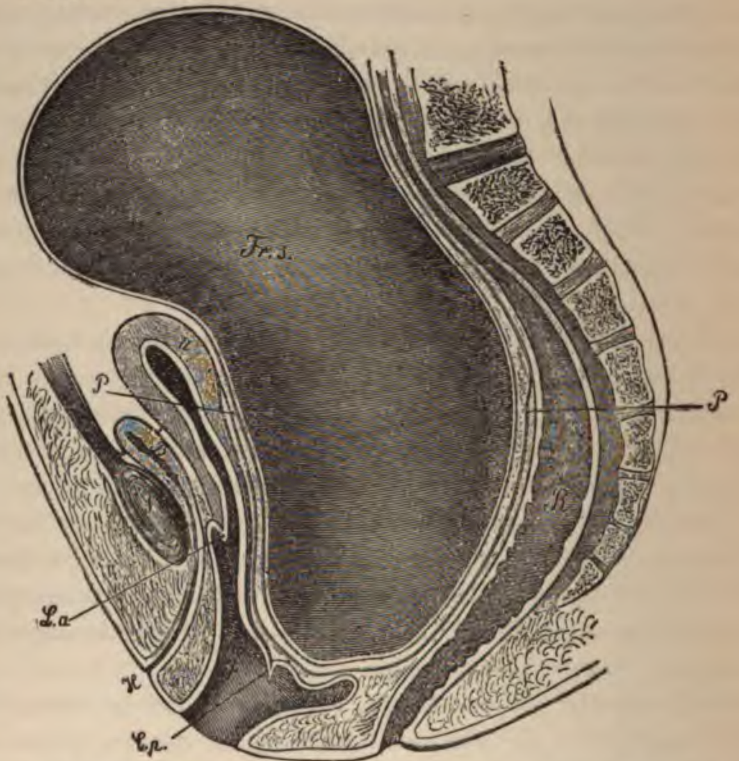


FIG. 17.—SCHEMATIC REPRESENTATION OF AN EXTRA-UTERINE PREGNANCY OF SEVEN MONTHS DURATION. *BH*, urinary bladder and uterus; *La*, anterior, and *Lp*, posterior os uteri; *V*, vagina. *Fr*, *s*, fœtal sac; *S*, symphysis; *R*, rectum; *P P*, peritoneum.

In the opposite case, however, when the sac lies high up, we cannot counsel an opening through the vaginal vault; the adhesions are liable to be ruptured, and hemorrhage into the peritoneal cavity occur. Laparotomy is therefore preferable.

We have ourselves observed a case which seemed very favorable for kolpotomy. In Fig. 17 is a schematic drawing of it, and we append a short history.

A woman twenty-nine years old was admitted October 7th, 1874. Had had two children normally, the last seven years ago. Seven months ago the menses ceased for two months, returned once, and then disappeared permanently. She was often sick during these seven months, pains, fever, swelling of the abdomen, and latterly constipation and inability to pass water troubling her. Two months ago she first felt life, and on October 18th we first heard heart sounds. The pelvis was filled with an indefinite fluctuating tumor, the lower border of which, pressing downwards before it the posterior cervical lip and the vaginal septum, could be felt between the tuberosities of the ischia. The upper border of the tumor reached to the navel. The uterus was displaced forwards and upwards, and could be distinctly felt through the abdominal walls. The anterior lip of the os uteri was opposite the middle of the symphysis; while the posterior lip could be felt below the tubera ischii, as a small prominent fold. In this way the posterior uterine wall measured 9.2 inches. On the afternoon of the 28th of October, violent pains appeared at times, and by the 30th they had assumed regular "bearing-down" features, while a bloody and mucous fluid flowed from the uterus.

The pains increased, and became unbearable. Peritonitic symptoms with increasing meteorism set in. The dilated intestines had by November 5th so displaced the fœtal sac and the posterior cervical and vaginal wall, that the tumor could be seen by separating the labia, while the cervical and vaginal walls were so thin that a finger could easily have been passed through them. With an ordinary pair of scissors the posterior cervical and vaginal wall was split for four inches; the fœtus, weighing seventy-four ounces, was in the second transverse position; it was turned and extracted. At the same time the placenta and the greater portion of the membranes were removed, there being much hemorrhage. A drainage tube was placed in the wound, and one also into an opening made into the sac above the bladder; and the cavity was washed out with lukewarm water. The woman rallied, and felt fairly well next day; but her temperature soon rose, and she died upon the evening of the 7th.

Post mortem.—In the epigastric abdominal region is a dirty, brown fluid exudate. Between the uterus and the posterior abdominal wall is a cavity the size of a man's head, bounded above by adherent intestines, omentum and abdominal wall, and below by Douglas's *cul-de-sac*. Its inner surface was covered with a dirty, bloody exudation, and at the left and anteriorly, showing the placental site, were large open veins.

The walls of the enlarged uterus measured four-fifths of an inch; its anterior wall was 4.8 and its posterior wall 6.4 inches long. The anterior neck of the cervix was two inches long, and showed the changes usual in this condition. The neck posteriorly was 4.2 inches long, and showed the incision 3.2 inches in length. The body and the upper part of the cervix contained decomposing remains of the decidua.

In the cases in which we consider the vaginal incision appropriate, there is no difficulty in carrying it out. The uterus is pressed forwards and upwards, the vaginal vault and cervix are depressed and thinner, and can be cut without danger of injuring other parts with scissors or bistoury. The hand can then be passed through the wound into the cavity of the ovum, and the child extracted by the feet. If the head sticks, we may, following Kiwisch and Gaillard Thomas, apply the forceps. The cord is then to be tied level with the surface of the wound with a disinfected thread, and iodoform gauze stuffed into the vagina and wound. Naturally no attempt is to be made to remove the placenta, only those membranes and shreds of tissue which appear at the level of the wound are to be taken away. A few days later we may try by gentle traction whether we cannot remove the placenta without special hemorrhage.

Under these circumstances the peritoneal cavity is usually not opened by the operation, on account of the multiple adhesions of the sac. If no attempt is made to remove the placenta the women will lose but little blood. The large incision permits the free outflow of discharges, and everything is in the most favorable condition for healing. If the secretions begin to smell, and fever appears, we should freely inject disinfecting fluids, or apply drainage if necessary.

c. *After the Death of the Fœtus.*

If the fœtus dies before or after it is viable, the symptoms may be various.

In the minority of cases there is more or less illness, and, usually with the symptoms of a circumscribed peritonitis, the fœtus becomes encapsulated. All authorities from Kiwisch down are of the opinion that under these circumstances operative interference is not allowable, since many women enjoy perfect good health after encapsulation, conceive repeatedly, and even have normal deliveries. Even Gaillard Thomas now (April, 1884) agrees with us. But most often Nature does not succeed in encapsulating the fœtus, and in her endeavors to eliminate it, more or less dangerous processes occur. There is constant suppuration, and the life of the woman is continually in the gravest danger. The pus may point in the vagina and rectum, or perforate these cavities, but Nature only rarely succeeds in eliminating all the foreign matter unaided.

The danger is greater the larger and more fully developed the dead fœtus is. Latterly there have been objections made to the expectant mode of treatment, but all authorities agree that operation is to be postponed until we are certain that the placental circulation has stopped. Litzmann places the proper time at five to six months after death, while Werth would operate in ten to twelve weeks. Schröder, who is inclined to favor active measures, has seen a smart hemorrhage from the placental site nine weeks after the death of the fœtus.

For not only are the dangers of the operation far less when the placental circulation has ceased, but, as Litzmann and Werth have proven, they are just as great before that time as they were during fœtal life. Litzmann has collected thirty-three cases from original sources, in which laparotomy was done a longer or shorter time after the death of the fœtus. The very important fact was clearly brought out, that, in the first ten of these cases, in which the operation was done eight days to five weeks after the death of the fœtus, the placental circulation had not stopped, and violent hemorrhage occurred during the operation, or during the gradual detachment of the placenta; eight of these ten women died. In the remaining 23 cases laparotomy was done six weeks to one year after the death of the fœtus, six of these 23 women died. Werth collected 25 similar cases, and eight of them died.

According to the relation of the sac the operation will resemble now an easy and now a difficult ovariotomy. It will always be better, when possible, to extirpate the entire fœtal sac, as has several times been done successfully. Schröder is of the opinion that it will more often succeed than we now believe.

If the sac is adherent to the anterior abdominal wall, and if total extirpation is inadvisable or impossible on account of extensive adhesions with neighboring parts, it would seem to be proper to open the sac under strict antiseptic precautions and provide for thorough drainage. If after the abdominal incision we find that the sac is not attached to the anterior bladder wall, we can, according to Schröder, adopt Volkmann's method of dealing with echinococcus cysts; the abdominal wound is filled with salicylated cotton, and the sac is opened at a later time, when adhesion with the abdominal wall has occurred.

If the case only comes under observation when Nature has already begun the elimination of the fœtus, we must encourage the process with all the surgical means at our disposal. If pus or the fœtus depresses the vaginal vault, it may be proper to do a kolpotomy; if nature shows signs of an attempt to eliminate the fœtus per rectum, it may be right to assist extraction in that way; or we may endeavor to keep open sinuses, or even dilate them, and extract the fœtus wholly or piecemeal ourselves. It has often been possible by enlarging the point of rupture in the anterior abdominal wall to extract a well-preserved or a macerated child or bony parts. In the same way fœtal bones have been extracted from the vagina, the rectum, and more rarely the bladder. The longer these natural efforts at elimination last the more adhesions are there of the sac; and the opening of the abdominal cavity is not much to be feared in later operative procedures.

The results of cases operated upon late are very favorable. According to Parry, in cases in which perforation was imminent, or had already occurred, only three women out of thirty-two died.

Past experience shows us that we need not fear active operative interference in these cases; and it is to be recommended that incision of the abdominal walls or the vagina, or the enlargement of fistulous tracts, be not shrunk from when nature points out the road of elimination. The suppurating sac left after total or partial extraction of the fœtus is to be treated as an ordinary abscess cavity.

d. *In Pregnancy in a Rudimentary Cornu of the Uterus.*

Since out of thirty of these cases twenty-three ended fatally in rupture during the first six months, laparotomy is certainly indicated just as soon as a diagnosis has been made. For the rest the rules are those laid down for extra-uterine pregnancy. Judging from the specimens in the museums, the operation will usually be an easy one (see Fig. 14). In cases of advanced pregnancy the operation has been done four times according to Sänger.

These cases are: 1. 1865, by Köberlé: Gastrotomy or Cæsarean section, twenty-one months after death of fœtus. Adhesion of the rudimentary cornu to the anterior abdominal wall; cure. 2. 1880, by Salin: Diagnosis only during operation. Removal of supernumary cornu after Porro; cure. The woman conceived again. 3. 1881, Litzmann-Werth: Woman septic at time of operation; Porro, death. 4. Sänger: Diagnosis before operation. Twenty-one years old; III-para, operation nine weeks after death of seven months fœtus. Removal of cornu without rupture; sym-peritoneal suture. Cure without reaction in twenty-two days. The woman bore children twice afterwards.

PART II.

DISEASES OF THE LIGAMENTS, PELVIC PERITONEUM AND PELVIC CELLULAR TISSUE.

CHAPTER III.

DISEASES OF THE ROUND LIGAMENTS.

REFERENCE to diseases of the round ligaments is infrequent in works on gynecology, on account of the rarity of such affections. Dr. L. Rau, of Heidelberg, has collected facts in relation to them from literature, and we borrow our remarks on this subject largely from his work. Tumors in and around the round ligaments, in the neighborhood of the inguinal canal, are of practical importance on account of their being easily confounded with hernia and fibrous tumors of the round ligaments, owjng to their intimate connection with the abdominal wall.

Malformations, Hypertrophy, and Atrophy, Hyperæmia and Inflammation, Lacerations, Spasm.—Abnormal shortening of one of the ligaments is frequently observed, and it may cause obliquity of the uterus to the corresponding side. Also a downward displacement of the round ligament on one side of the uterus may cause a slight displacement of the organ. Absence of the round ligaments is observed only with absence of the uterus. Ruysch describes a case where there was a second round ligament attached to the neck of a uterus that was deflected to the right. Klob thinks that in this case a membranous band was mistaken for a round ligament.

Hypertrophy and Atrophy.—As the round ligaments are really continuations of the muscular structure of the uterus, hypertrophy is a constant accompaniment of pregnancy, and during their thickened state they can be felt on the side of the uterus. In case of pregnancy in one horn of a double uterus, the ligament on the corresponding side is found thickened.

Thickening of the round ligament always accompanies pathological enlargement of the uterus. Likewise with atrophy of the uterus we find the round ligament diminished in size.

Hyperæmia and Inflammation.—Scanzoni repeatedly found the ligaments in a state of hyperæmia in women who died during menstruation, and also where the return circulation had been impeded for a long time.

The distension of the veins in the inguinal canal, that is frequently met with in pregnant women, has been described by Aetius as *hernia varicosa mulierum.* Boivin and Dugés illustrate the same condition after Cloquet as "*Varicocèle des cordons suspubiens,*" with the remark that the distended veins might simulate double inguinal hernia. Similar cases are reported by Cruveilhier and Teale. Rau quotes several cases where the round ligaments were the sole seat of an inflammatory process. Scanzoni observed the extension of inflammation from the uterus to the round ligaments in the bodies of women who died during the puerperal state, and is also inclined to ascribe the pain that is frequently felt in the inguinal region in cases of chronic metritis to the extension of the inflammation from the uterus to the round ligaments.

Petsche reports a case of laceration of the round ligament and its prolapse by the anus. Korb mentions a case where, during delivery, rupture of a vessel caused hemorrhage into the parenchyma of the round ligaments, and through the inguinal canal externally, forming a hematocele on the right side.

Spasm of the round Ligaments.—This is an affection observed in 1805 by Delmanzo at the Tübingen clinic, and quoted by Scanzoni. An epileptic girl of nineteen years at times felt violent pains in the right inguinal region, and thought that something protruded there. At each attack the cervix was found to be displaced to the left, and when the pains subsided, it returned to its normal place. F. A. Walter and Voigtl mention a calcification of, and Boivin and Dugés an osseous concretion in, the round ligaments.

Hydrocele of the round Ligaments.—The most frequent cause of the disease described under this name, seems to be the persistence of the processus vaginalis. Dr. Saechi pointed out in his treatise on "Hydrocele in Women" that Warthon, Camper, Weisberg and others found that this peritoneal appendix existed both in young girls and adults. Dr. Zuckerkandl in his treatise on the "Vaginal Process of the Peritoneum," states that he found in the cadavers of nineteen girls aged from one to twelve weeks four times the diverticulum of Nuck, three of which were on both sides. In his investigations he came to the conclusion, that with the formation of the anterior abdominal wall, the vaginal process also grows if it is not obliterated soon after the descent of the testicles. The diverticulum of Nuck may remain open, or become obliterated at a higher point, in such a way that a hollow space is left behind, as illustrated by Klob. In both cases this hollow space may become filled by a serous or purulent exudation, forming tumors which have been frequently opened by surgeons, who by the symptoms diagnosticated strangulated hernia, were induced to perform herniotomy, and found neither intestine nor omentum.

O. Chiari has contributed a paper on this form of tumor in the inguinal canal, and also explained the relation of surrounding inflammations to the same. He quotes three cases from Dumreicher's clinic, which on account of the importance of the subject, we will briefly recapitulate.

In the first case a woman aged sixty noticed six months previously a tumor the size of a nut in the right inguinal region, which, three weeks before she was seen, suddenly increased to the size of an apple. When entering the clinic there was found a club-shaped swelling 2¾ inches in length, at the upper part about 3½ inches broad, and at the lower part ⅘ to one inch, extending from the right inguinal region to the lower portion of the labium majus. The overlying skin was red and swollen, and the most prominent part was tympanitic. After opening layer by layer, a large quantity of putrid pus and gas escaped. In the deeper part a nut-sized sac with a small opening in the anterior wall was found, communicating with the abdominal cavity by a fistulous opening.

In the second case a woman aged forty-five noticed for four years, in the left inguinal region, a swelling which was always easily reducible. Later it became the size of a goose-egg, very painful, irreducible and situated in the upper part of the labium majus; on account of great pain, constipation, and nausea she came to the clinic. As there was vomiting she was operated upon. A cavity was found filled with serous fluid containing septa, and ending in a blind duct ⅘ of an inch in the inguinal canal.

In the third case a pigeon-egg-sized swelling in the right inguinal region was produced six weeks previously, by lifting a heavy weight. On account of great pain in the swelling, and nausea, she came to the clinic. She was operated upon on the supposition that she had a strangulated hernia, and a longitudinal sac was found, which was separated into an upper and lower portion by a partition that was indicated by a groove, on the outside. Both parts contained a yellow purulent fluid, and were lined by a mucoid, velvety, fringed, highly injected membrane.

All the three women recovered.

O. Chiari cites several similar cases, in which Chassaignac and Pitha made incisions for supposed hernial sacs, and obviously found nothing besides the remnants of the diverticulum of Nuck around which inflammation and suppuration had taken place.

Klob states the origin of these cystic cavities of the inguinal canal to be as follows:

If the assumption of E. H. Weber is correct, there would be two possible origins for the so-called sacculated hydrocele or cyst. Weber asserts that the gubernaculum Hunteri (later the round ligament) is originally a hollow pouch surrounded by muscular fibres, deficient involution of which may give rise to a cyst of the round ligament. The other mode of origin of this variety of cysts, consists in an excessive development of the processus vaginalis peritonei, which is followed by either partial or no involution at all at the internal abdominal ring, leaving a space in the inguinal canal or at its opening, surrounded by peritoneum. This would explain the anatomical relation of these cysts to the round ligament, as described by Klob.

In the course of the round ligament, usually at the internal abdominal ring, thin-walled serous cysts, from the size of a pea to a hazel-nut, are found, and the relation of the round ligament to them varies. Either the round ligament is situated in the wall of the cyst, usually posteriorly or to the inner side, so that it can be seen through the wall of the same as a whitish or yellowish red cord, or it is entirely obscured by the cyst, so that it appears as if it were interrupted. Klob mentions two remarkable *post-mortem* cases where herniotomy had been performed, and where only hydrocele feminæ cystica existed.

The cystic cavities continuous with the processus vaginalis, and communicating with the abdominal cavity are called by Klob hydrocele peritonealis or congenita. Hennig also saw a case of hydrocele produced through an opening in Gimbernat's ligament, and called it hydrocele muliebris interna.

Bends has differentiated three kinds of hydrocele in the external genitals of the female, which anatomically and pathologically correspond to those of the male. 1. *Hydrocele œdematosa* or *diffusa*, which is a serous infiltration into the connective tissue of the round ligaments. 2. *Hydrocele peritonealis* or *congenita*, which is a collection of fluid in the diverticulum of Nuck. 3. *Hydrocele saccata*, which is fluid in a closed sac, either a new formation or arising from an abnormal prolongation of the peritoneum.

The disease seems not to be a rare one, as Hennig collected forty-one cases from literature up to 1884.

Symptoms and Course.—From what has already been said, it is evident that if a processus vaginalis persists, fluid will collect in it rarely in early, and more frequently during advanced life; further, the sacks so formed are at first usually the size of a pigeon-egg, and situated in the inguinal region, and may exist for years without causing annoyance to the patient. In some cases the swelling was at first reducible, a communication with the abdominal cavity existed; later it became irreducible, adhesions having formed in the inguinal canal, or obliteration of the processus vaginalis having taken place.

Usually from injury, but at times without appreciable cause, inflammation and suppuration set in; occasionally also blood extravasation takes place in and about the sac. With the inflammation a rapid increase of the swelling occurs, accompanied by violent pains. The integument becomes reddened and swollen, and symptoms of irritation of the adjacent peritoneum are developed, thus creating a condition similar to incarcerated hernia.

Diagnosis.—According to what has been said, when we have to deal with hydrocele peritonealis or cystica, or when the formation of the latter from the former is observed, the diagnosis can be made with certainty from the history, course, form and situation of the swelling at the inguinal canal. Often the diagnosis will be doubtful, as other tumors produce the same symptoms. But if inflammation sets in or about the sac, the resemblance to incarcerated hernia is so great that it can not be differentiated from it, for the tympanites and constipation which are absent in these varieties of swelling may also be absent in incarcerated hernia if it only involves an intestinal diverticulum or omentum.

Treatment.—Hydrocele hardly requires treatment before symptoms of inflammation appear. To prevent the formation of hernia, and also because the walls of the peritoneum may yet become adherent in early life, a truss should be worn if the swelling or fluid is reducible. Small swellings of this variety, which usually cause no inconvenience, should not be touched. When larger and not communicating with the abdominal cavity, they may be advantageously punctured and injected with iodine or simply incised. Hennig punctured a cyst of the round ligament, 3¾ inches long by 2½ inches in breadth, which extended by a round prolongation into the inguinal canal, and inserted a double iron wire. C. Braun extirpated a goose-egg-sized cyst with serous limpid contents, which extended from the left abdominal ring into the labia majora, and terminated by a strong pedicle in the inguinal canal. If with inflammation and suppuration in or about a female hydrocele symptoms of incarceration are simulated, the only thing to be done is to immediately open it layer by layer, being prepared to perform herniotomy if necessary.

New Growths of the round Ligaments.—As the round ligaments are true prolongations of the uterus, especially of its superficial muscular fibres, it is not strange that the same new growths occur on them. F. Winckel was, to our knowledge, the first to show the uterus of a woman seventy-six years of age, with two pea-sized pediculated myomatous polyps of the round ligaments attached to it; and, according to Sänger, Spencer Wells has from 1865 to 1866 operated for two fibrous tumors, which were connected with the round ligament, and were of the size respectively of an orange and cocoanut. Since, in rapid succession, a whole series of operations performed by Leopold, Kleinwächter, Duplay, Hofmokl, Sänger and others have been published, where smaller and very large tumors of a fibromyomatous character, connected with the anterior abdominal wall or situated therein, and originating from the round ligaments, were removed. Sänger has collected up to 1882 twelve cases of this nature, and described them fully.

CHAPTER IV.

INFLAMMATION OF THE BROAD LIGAMENTS OF THE PELVIC PERITONEUM AND PELVIC CELLULAR TISSUE.

THE ancients are said by some authors to have had knowledge of this class of diseases. T. G. Thomas writes that it is most probable that Archigines, who was famous in the second century, refers to these diseases, and that his view was afterwards accepted by Oribasius (326-403) and Aetius (550) and Paul Aegina (670). But in all of these writings only abscess of the uterus is mentioned, and only Paulus speaks of cases in which the pus was located above the os uteri. Matthews Duncan thinks that many indications in these writings referred to this class of diseases. But the name pelvic cellular tissue is not mentioned, and therefore the true nature of these diseases was no more recognized than in the writings of the XVIth and XVIIth centuries.

Mauriceau was the first to speak clearly about post-puerperal tumors, and Puzos (1760) described the disease somewhat more distinctly. The first thought the process was due to retained lochia, the second to metastases of the milk in puerperal women. Puzos' idea was retained until our century, and was sustained by Ritgen, A. E. Siebold, Busch and many of their contemporaries. German writers, as F. B. Osiander (1794), Kranefuss, Mikschik, Kyll, A. E Siebold, Busch, Kiwisch and others, according to W. Schlesinger's history, long ago exhaustively mentioned these diseases. Later, French physicians, Bérard, Dupuytren Bourdon, Marchal de Calvi, Verjus and others, recognized the connection of these diseases with a morbid state of the uterus. Our knowledge regarding these diseases was greatly increased by the writings of Nonat, who began his investigations on this matter in the year 1846; he described the subacute and chronic forms of the process, and observed its occurrence aside from the puerperal state. From this time on this disease was repeatedly and completely treated of by French, German, and English writers, such as Gallard, Gosselin, Bernutz and Goupil, Doherty, Churchill, Lever, Bennet, West, Simpson, Matthews Duncan, Kiwisch, Scanzoni, R. Olshausen, Spiegelberg, W. A. Freund and others.

The disease has been described under different names, depending upon the prevailing opinion with regard to its origin, and the stage of the disease considered as the most important. Doherty described it as chronic inflammation of the uterine appendages; Nonat as peri-uterine and lateral phlegmon; Churchill as abscess of the uterine appendages, and Marchal de Calvi as phlegmonous pelvic abscess. These denominations, to which Simpson added the name of cellulitis, maintaining that in these cases an inflammation of the pelvic cellular tissue precedes the pelvic abscess, were in general used until Virchow's investigations on this subject.

Virchow, who claimed that such terminology was defective in that it did not indicate the separation between the peritoneal and sub-peritoneal pelvic disease, proposed for the inflammatory disease of the pelvic cellular tissue the name parametritis. He says: "There are several organs having appendages which are not included under the anatomical name of the organ itself, but are described as surrounding connective tissue, capsule or appendages. If we have to deal with pathological processes in these appendages or their surroundings, we are at a loss how to name them. Thus the kidneys lie in a capsule of fat, which at times becomes the seat of an independent inflammation, suppuration and exudation, and likewise the bladder and the uterus are surrounded at their lower and lateral portions by loose fat and connective tissue, which at times become diseased independently, more frequently secondarily, but in such a way that this becomes the main change. For such processes I propose the names paranephritis, paracystitis and parametritis. As we are now accustomed to use the terms pericystitis, perimetritis, perisplenitis, etc., for inflammations of the free covering of the organs, which nearly correspond to the terms peritonitis vesicalis, uterina, linealis; and as it must be admitted that for these kinds of affections a separate name is required, it is evidently necessary also to designate inflammations of the adherent and adjacent structures specifically. This is especially necessary with regard to the uterus. For the loose connective tissue and fat which binds down the vagina and the neck of the uterus laterally, at the same time forming the basis of the broad ligament, is the most frequent seat of disease, and yet it would be erroneous to speak in such a case of a disease of the broad ligament. The name parametritis will do away with the obscurity."

Since that time the name perimetritis is used for inflammation of the peritoneum, which covers the uterus and its surroundings, and the name parametritis for inflammation of the connective tissue surrounding the uterus. But as the inflammatory disease of the pelvic peritoneum rarely limits itself to the covering of the uterus, but usually extends to the adjacent peritoneal covering, and since as the disease of the connective tissue is rarely confined to the neighborhood of the uterus, but often extends to distant localities, assuming there greater intensity than in the immediate neighborhood of the uterus, many authors consider the names perimetritis and parametritis insufficient, and use the older names for the diseases in question. So Barnes proposed the name pelvic cellulitis for inflammations of the pelvic cellular tissue, and for inflammation of the peritoneum which lines the pelvis and invests its organs, the name pelvic peritonitis. Many authors have accepted his proposition, and at present for inflammatory diseases of the pelvic peritoneum, the names perimetritis and pelvic peritonitis, and for inflammatory diseases of the pelvic cellular tissue, the name parametritis and pelvic cellulitis are used synonymously.

Anatomical Relations.—In order to understand the varieties of diseases which may affect the pelvic peritoneum and cellular tissue, especially the mode of extension of inflammatory processes in the pelvic connective tissue, and the distribution of pus and extravasated blood, it is necessary to have a full knowledge of the peritoneal lining and connective tissue of the pelvis.

To obtain a clear idea how the peritoneum lines the pelvis, and its relation to the uterus and its appendages, we may imagine the pelvic cavity lined by peritoneum, and the uterus with its appendages pushed up from below between the rectum and bladder, whereby a large portion of these organs is covered by peritoneum. The organs are more or less covered by peritoneum, the cervix and parts of the round ligaments being free from peritoneum, towards the so-called sub-peritoneal cavity. By means of this upheaval of the uterus, the strong broad ligaments are formed on either side by duplication of the peritoneum. Regarding the form and situation of the spaces so formed between the uterus and bladder on the one hand, and the uterus and rectum on the other, and concerning the folds of the peritoneum thus produced, the text-books on anatomy afford sufficient information.

Special attention is to be called to the fact that from the superficial muscular layer of the side of the uterus, numerous muscular structures arise, which become partly adherent to the abdominal wall, partly to the pelvic wall, and partly radiate into the perimetric tissue. The round ligaments, hence, are true prolongations of the superficial muscular layer of the uterus; they pass out covered by loose cellular tissue, through the inguinal canal, join there the muscles of the abdominal wall, and in the same way, the muscular fasciculi coming from Douglas's pouch, and described as retractors of the uterus, blend with the wall of the rectum and the sacrum as partly muscular bundles Laterally the ovarian ligaments form prolongations of the uterine muscular fibres, and likewise there radiates into the anterior and posterior layers of the broad ligaments, a fairly strong muscular structure blending with the vessels, nerves and connective tissue which surround the uterus, and further the vesico-uterine ligaments contain muscular fibres derived from the uterus. The bladder and rectum are also attached to the pelvic wall by delicate muscular fibres. The muscular fibres radiating from the uterus usually participate in all inflammatory processes of the uterus, in this way carrying the inflammation to peri-uterine tissues.

Until recently little attention was paid to the connection between the peritoneum and pelvic organs, and to the distribution of the loose cellular tissue. Only since the intimate relation between the connective tissue and the lymphatics was determined, and their importance as a channel for inflammatory products was recognized, have investigations in this direction been reassumed. There are three methods of successfully studying the same. The first method is the anatomical preparation; the second is to study the topographical extension and anatomical relation of the pelvic connective tissue by making systematic sections of specimens hardened by alcohol or freezing; the third method is to inject air or fluid into the sub-peritoneal space.

By the first method the existence of the pelvic cellular tissue and its extensive distribution was recognized, but the difference in firmness with which it adheres to the underlying tissues in the different localities of the pelvis, and with which it connects the different layers of peritoneum to one another, can not be ascertained with knife and finger, and yet a full knowledge of this is necessary for the determination of the distribution of blood extravasations and collections of pus. By this first method especially, Luschka, in his work on the position of the abdominal organs, demonstrated the relations in question, and illustrated them clearly.

Luschka's statement regarding the pelvic cellular tissue in the above-mentioned work, is as follows:

"Under the peritoneal sac a layer of cellular tissue more or less pervaded by fat invests the parts that are uncovered by peritoneum, and extends uninterruptedly, so as to fill the spaces left between the lower margin of the peritoneum and the levator ani. If we consider that the latter presents to a certain degree a pelvic diaphragm in the median plane by extending from the walls of the pelvis and descending gradually, we will readily understand that the pelvic cavity is divided by it into an upper and lower space. Now as the peritoneum does not reach down to the levator ani muscle, there must necessarily be left a space between the two, and by this the cavity above the levator ani is divided into a peritoneal and sub-peritoneal cavity. But between the under surface of the levator ani and the pelvic wall, especially laterally, a very deep space is also left

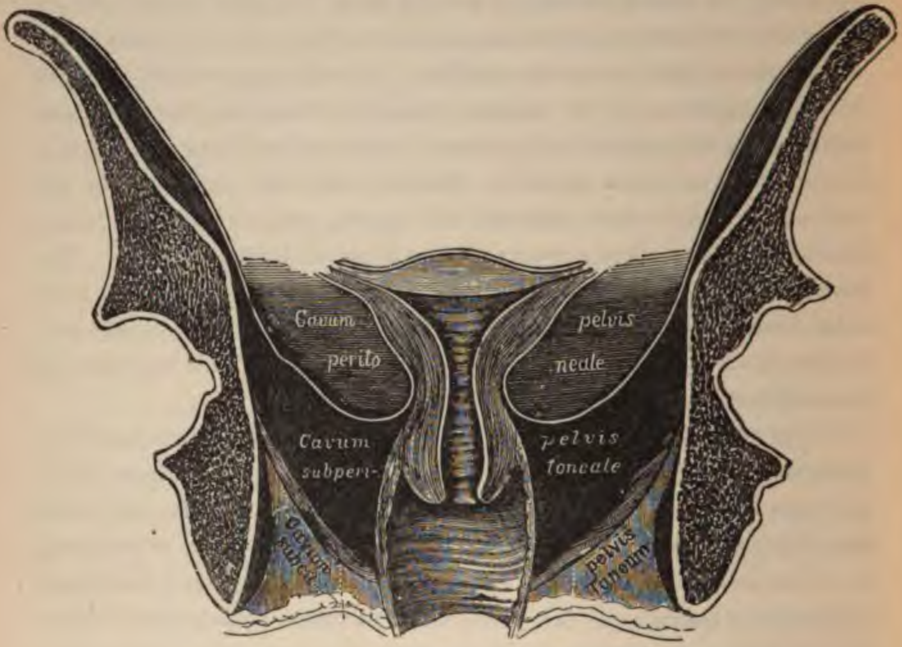


FIG. 18.—SECTION THROUGH A FEMALE PELVIS SHOWING ITS THREE CAVITIES. (Illustrated by Luschka, for Beigel's Manual.)

filled with fat, which being limited by the skin may properly be called the subcutaneous pelvic cavity. Of these three divisions of the true pelvis, the sub-peritoneal pelvic cavity is of great practical interest, as its contents surrounding the organs uncovered by peritoneum often become the seat of abscesses, which find their way in different directions, for instance through the great sacro-sciatic foramen under the muscles of the buttock. Its contents do not only consist of loose fatty cellular tissue, allowing the expansion of the hollow organs, and the adaptation of the loose peritoneum to the increase in volume of these organs without being stretched, but the sub-peritoneal cavity also contains numerous arteries, veins, absorbents and lymphatic glands. Especially do the largely developed venous plexuses form a considerable part, which certainly serves the purpose of a compressible surrounding for the pelvic organs, always ready to fill up the space left by a decrease in volume of the same. This cellular tissue also surrounds a portion of the rectum and bladder, as well as the portions of the uterus we have mentioned, and it is hence necessary to define the natural limits of what is spoken of in gynecology as the parametrium."

Frankenhäuser, in demonstrating the nerves of the uterus, also revealed the pelvic cellular tissue (*vide* plate IV. and VI. in his treatise on "The Nerves of the Uterus," Jena, 1867).

Before we proceed to describe the data as obtained by the other methods, it seems useful to direct attention to the mode of connection between the peritoneum and the uterus. This will make clear why some tumors that appear in the sub-peritoneal cavity assume certain forms. The peritoneum is only in firm connection with muscular tissue at the body of the uterus. This connection is to a certain extent downwards, so intimate that it can only be separated piecemeal and with great care from the underlying structures. The line where the peritoneum is firmly attached to the uterus, is toward the front, on the fully developed virgin uterus, nearly in the middle of the organ, and corresponds to the point designated as the internal os. From this point downwards it is attached by very loose connective tissue to the supra-vaginal portion of the cervix, and to that portion of the bladder over it. Posteriorly the firm attachment of the peritoneum is a few lines somewhat higher up, and it is loosely connected below with the uterus, cervix and vagina. Somewhat different is the connection at that portion where the peritoneum, becoming reflected on the rectum, forms Douglas's *cul-de-sac*, and it usually lies a little above the middle of the vagina. At both sides of Douglas's *cul-de-sac* the loose cellular tissue is more abundant, and numerous muscular fasciculi are found, named by Luschka the retractors of the uterus. The lines of firm attachment of the peritoneum anteriorly and posteriorly, arch over the lateral parts of the uterus, in such a way as to form a triangle, the apex of which reaches to the tubal openings. In this triangular space there is a large amount of loose cellular tissue, which connects the broad ligaments, extends to the uterus, and covers its base, and contains the uterine vessels and nerves, cervical ganglia, and the whole portion of the ureter which extends through the parametrium.

Among others Savage gave a clear description of the sub-peritoneal cellular tissue. He writes: "A plane extending from the middle of the posterior surface of the symphysis pubis to the point of articulation of the third with the fourth sacral vertebra, which intersects the uterus at the junction of the body with the neck, will, with rare exceptions, divide the pelvic cavity into two spaces, a peritoneal and a sub-peritoneal. The parts lying below this plane are imbedded in the cellular tissue, which occupies that portion of the pelvis which contains no intestine. The structure consists of fibro-elastic, muscular and connective-tissue elements, and is so arranged that its meshes or cells communicate freely with each other."

The second method was carefully elaborated by W. A. Freund, who by means of systematic sections through the pelvic cavity made clear the architectural anatomy of the pelvic connective tissue, from which the pathological changes it may undergo are easily recognized.

Freund considers it desirable to make further subdivisions of the pelvic connective tissue immediately surrounding the pelvic organs, and thinks that we could as well speak of paracystium, paracolpium and paraproctium as of parametrium.

The third method, the injection of air or liquid into the sub-peritoneal space, has been also successfully utilized to distinguish the relations existing between peritoneum and pelvic cellular tissue.

The first to use this method for the purpose of studying the cellular tissue in general, was Bichat. He injected air and water into cellular tissue, and pointed out that the spaces within it must become the channels for pathological exudations. He was followed in this direction by Henke, König, and W. Schlesinger.

Henke proved by injecting the whole arterial system of a cadaver with water the direct communication existing between this system and the interstices of the connective tissue. In this way he demonstrated the distribution of the connective tissue in the neck and the cellular tissue in the pelvic and abdominal cavities.

In this connection the researches of König and Schlesinger are most important, as they treat specially of the cellular tissue of the female pelvis. Since by these researches the manner of distribution of pus and of blood is shown, and light is thrown on the manner after which inflammatory processes invade the sub-peritoneal space, we consider it useful to give an account of the results obtained by them.

König utilized the bodies of women who died of non-puerperal affections shortly after delivery, and injected water or air under the abdominal walls. The results of his observations he states as follows:

1. An exudation in the connective tissue of the broad ligaments in the neighborhood of the tubes and ovaries primarily extends in the course of the psoas and iliacus, and later gravitates into the true pelvis.

2. An exudation which has for its seat primarily the deeper connective tissue in the antero-lateral region of the junction of the body with the neck of the uterus, fills first the cellular tissue of the true pelvis laterally from the deeper portions of the uterus and bladder, and later usually extends along the round ligaments to Poupart's ligament. From thence it extends into the fossa iliaca outwards and backwards.

3. Abscesses formed in the posterior surface of the broad ligament first fill the posterior lateral parts of the pelvis (Douglas's *cul-de-sac*), and afterwards follow the track described under 1.

4. Later they become similar, since the same portions of the peritoneum are equally displaced.

5. When the pus gravitates to Poupart's ligament, even a small quantity separates the peritoneum so far from the ligament that a puncture 1½ finger-breadths above the same will pierce the abdominal wall without touching the peritoneum.

W. Schlesinger experimented on cadavers of women who did not die shortly after childbirth, and also on such that had never been pregnant. He used boiled and filtrated glue, mixed with a granular coloring matter, and injected it by measurable pressure. These experiments were completed by injecting glue under the mucous membrane of the vagina, determining by this the mode of diffusion of extra-peritoneal exudations originating from the cervix uteri.

Lately Schlesinger completed these investigations by injecting the labia majora and their surroundings, determining by this the mode of diffusion of blood extravasations in the surroundings of the vagina.

Since the results obtained by injections correspond to observations made on the living body, there can be no doubt that the pelvic connective tissue serves as a medium for the diffusion of blood extravasations and pus accumulations, and that it also exerts an influence on the spread of inflammatory processes; but certainly it is not the only rule for the extension of inflammation, which König himself admits. The lymphatics and blood-vessels play in this respect certainly a more important *rôle.*

Pathology of Inflammation of the Pelvic Peritoneum.—Inflammation of the peritoneum covering the uterus and its appendages, and lining the pelvic cavity, presents different conditions, depending upon whether the disease was acute or chronic, and whether it came early or late under observation, and upon the nature of the infection which caused the disease. In one case all the organs covered by the pelvic peritoneum may be involved, in another only the covering of one or another of the organs may be greatly affected. Thus the tubes, especially at their abdominal end, the ovaries, or the peritoneal covering of the uterus, may be acutely affected, the inflammation extending irregularly to the surrounding peritoneum. Based on *post-mortem* observations, we may from a pathological standpoint readily divide inflammatory diseases of the pelvic peritoneum, according as one or the other organ is more intensely involved, into perisalpingitis, periöophoritis, and perimetritis.

But as very often several organs of the pelvis are equally affected by the inflammation, and portions of the surrounding peritoneum frequently and irregularly participate in the affection, and as all have the same cause, a more or less diffused inflammation of the pelvic peritoneum is also properly named pelvic peritonitis.

The process does not materially differ from inflammation of other parts of the peritoneum. The vessels of the affected peritoneum at first are injected, and sero-albuminous or sero-fibrinous exudation takes place on the free surface, from which either smaller or larger flakes separate, or a membranous deposit forms. At the beginning, the exudation is clear, but soon becomes turbid from pus elements, which rapidly increase in severe cases, changing the exudation to a thick creamy mass.

The acute septic forms are usually only noticed shortly after parturition or abortion, and as a rule are fatal. Here we treat mainly of cases arising during the puerperium, having a prolonged course, or of such which are apparently recovered from, but which leave changes in the pelvis, which readily change into other affections.

In post mortems on women we frequently find remains of a circumscribed peritonitis. By inflammation of the peritoneum, new connective tissue, richly supplied with blood-vessels, is rapidly formed, covering the affected parts with a pseudo-membrane, and by its contraction displacing the organs of the pelvis or binding them firmly together. In this way the organs (tubes and ovaries) may form a tumor-like mass in which the intestine may become entangled. The frequent occurrence of these conditions, for instance, in more than half of the necropsies on women, (and F. Wickel found them in 33 per cent. of all post mortems,) makes it evident that they may run their course during life without severe symptoms or extensive exudations. This form of the disease is well designated by the name adhesive pelvic peritonitis.

Between the adherent organs, in recent cases, pus centres are frequently found, or by the adhesions of the organ spaces may be formed, filled, according to the course and cause of the process, with serous or sanious fluid, pus or ichorous material. The encapsulation of these masses usually takes place in Douglas's *cul-de-sac*, often forming there large tumors resembling an hematocele. These instances are frequent, and to them the term exudative peritonitis is applied.

Masses of exudation, when encapsulated in large quantities, may remain unchanged for a long time; exceptionally, from one or another cause, they result in the formation of pus. The ultimate termination varies; under certain circumstances the pus may change into an ichorous liquid, or by retrogressive changes undergo absorption; it may remain enclosed for months or years in small compartments, a constant danger-source of extensive disease, or it may spread in larger quantities and form intra-peritoneal abscesses. Such abscesses are usually observed behind the uterus, and are named retro-uterine abscesses or retro-uterine pyocele. The pus may evacuate externally through the rectum, vagina, or in rare cases through the bladder, or the pseudo-membrane, which encapsulates and separates the same from the peritoneal cavity, may become destroyed and the rupture occur into the peritoneal cavity.

Post mortems frequently accidentally reveal the great influence that pseudo-membranes and adhesions formed between the organs, during the course of pelvic peritonitis, have on the health of women. The uterus and its adnexa are found to be so extensively covered with pseudo-membranes, that it is difficult to separate the individual parts from one another. Between the layers of the pseudo-membrane are frequently found accumulations of serum, degenerated blood, cretaceous or even osseous masses. Klob emphasizes that in cases of perimetritis the adjacent uterine parenchyma always participates, frequently becoming destroyed by fatty degeneration, and that the new connective tissue forms a tough non-contractile crust-like layer, which takes part in the enlargement of the uterus during pregnancy.

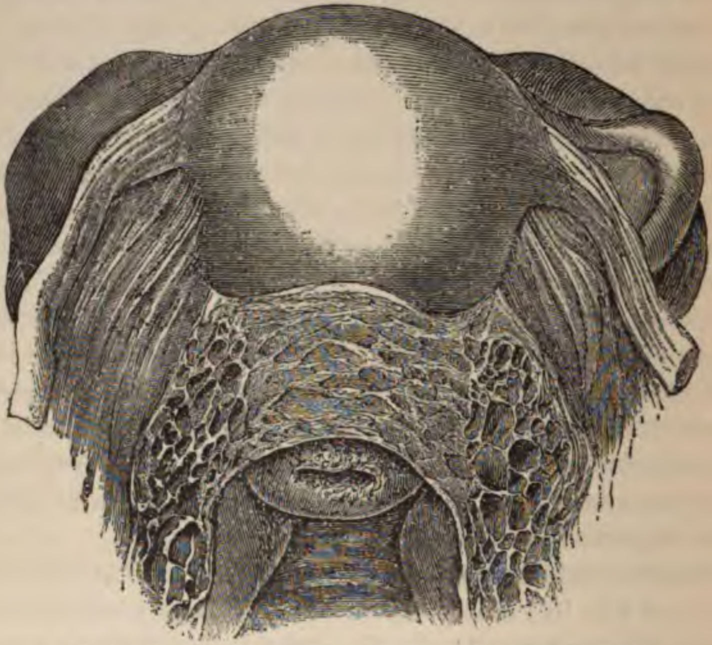


FIG. 19.—PUERPERAL PARA—AND PERIMETRITIS. (After *Heitzmann.*)

Inflammation of the Pelvic Connective Tissue.—For more thorough pathologico-anatomical investigation of this matter, we are indebted to Virchow. W. A. Freund persistently called attention to a form of parametritis which rapidly leads to a contraction and thinning of the pelvic connective tissue. (Parametritis chronica atrophicans.) He has exhaustively described the results of his investigation on this subject in his monograph, "Gynecological clinic, Strasburg, 1885," to which we refer the reader. According to Virchow the uterus itself as well as the connective tissue surrounding it are frequently the seat of puerperal diseases, which are at times independent, but most frequently secondary, in which case this tissue plays the major part in the disease. The process often follows the course of the connective tissue for a great distance, spreading in certain localities, from which it again radiates, thereby assuming a course similar to irregular erysipelas. Its favorite seats on the uterus are the parietal layers; next the process invades the loose connective tissue around the vagina and cervix, extending from there to the inner portions of the broad ligaments, the sheaths of the blood-vessels and lymphatics. Virchow also thinks that the disease is generally due to traumatism of the external genitals; "but this is not always the case, and therefore the process resembles the diffuse form of phlegmonous erysipelas, for which reason the name *erysivelas malignum vuerperale internum* was applied to it by him."

In the acute septic cases, very often no other changes are found in the cellular tissue except œdema and dark discoloration of the tissue, but the lymphatics filled with pus and micrococci (metrolymphangitis), and the frequently diseased veins (metrophlebitis), show the course of extension of the infectious process. In sub-acute cases, where exudation into the meshes of the cellular tissue has taken place, if due to a septic poison, the loose connective tissue may become destroyed to a great extent, undergoing purulent and ichorous changes which may involve the whole parametrium. In cases where the poison is less virulent, there must be an extensive exudation of albuminous or fibrinous material in the meshes of the cellular tissue, as shown by the soft swellings, that can be observed shortly after the beginning of the process. (See Fig. 19.) In recent cases the pelvic connective tissue is largely infiltrated with gelatinous material containing numerous small cells. After a short time the soft swellings become hardened, the fluid portion of the exudation having become absorbed. If the disease takes a chronic course, the peri-uterine connective tissue is changed into a hard unyielding mass, fixing the uterus on one or all sides, or out of the cellular tissue are formed circumscribed large hard tumors, poorly supplied with blood, often reaching to the inlet of the pelvis, and insinuating themselves between bladder and uterus, rarely between rectum and uterus, or becoming prolonged beyond the limits of the true pelvis, especially in the direction of the reflections of the peritoneum. Frequently the exudation extends in this way from the broad ligament to the iliac fossa, or to the anterior abdominal wall; furthermore, it may extend through the pelvic inlet to the kidneys. In recent cases pus centres are frequently found in these hard masses, showing the different stages of retrogressive changes.

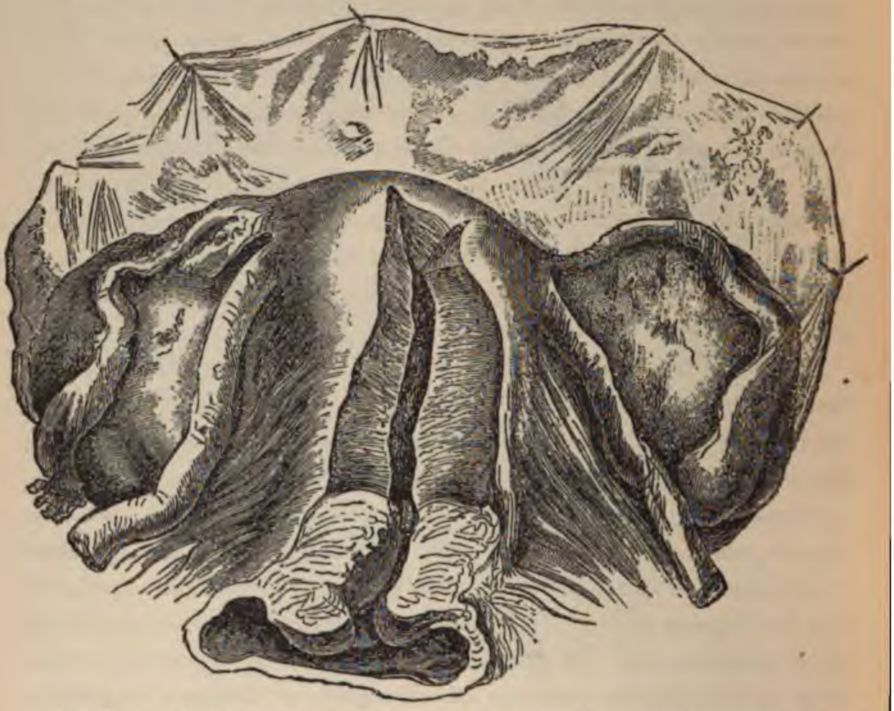


FIG. 20.—ROOF-LIKE PSEUDO-MEMBRANE RESULTING FROM GENERAL PELVIC PERITONITIS. Four-fifths of the normal size. (After *Heitzmann.*)

From examinations on the living subject and cadaver, it is certain that in most cases inflammations of the parametrium leave cicatrices similar to those left by inflammations of the peritoneum, and which subsequently undergo contraction and hardening. These cicatricial changes varying in amount are readily found with the microscope.

Uteri of virgins where the peritoneum, as the result of catarrhal affections of the cervix is not as movable as normally; uteri, where from laceration of the cervix, or without any appreciable injury to this organ, there is fixation by adhesions, which radiate in the parametrium, or where there is displacement in any direction; uteri, where the broad ligaments are not as easily stretched as normally, or where at the same time there are present indurations or marked shrinkage, and where the nerves and blood-vessels are enclosed in cicatricial tissue, are often accidentally found in the cadaver.

Figures 19 and 20 illustrate well the described process. Fig. 19 illustrates acute puerperal inflammation of the uterus and parametrium. Fig. 20 illustrates well cicatricial changes in the same structures, following an intense inflammation, as seen *post mortem*. In Fig. 20 there is also a tent-like pseudo-membrane arching over Douglas's *cul-de-sac*, for the representation of which the drawing is mainly intended.

Inferring from *post-mortem* cases, we must distinguish, in parametritis as well as in pelvic peritonitis, two forms of the disease; one severe, occurring after childbirth or injury to the genital canal, and the other milder, comprising all of the inflammatory affections of the uterus, especially of the parametrium.

In the following pages we will speak of the first form as acute inflammation, and of the second as chronic inflammation, and of the tissue changes produced by these inflammations as the "residue" of the inflammation.

Acute Pelvic Peritonitis and Parametritis.

Etiology.—Etiologically these diseases can be divided into two groups, for in a large majority of cases the acute form originates in an intense infection happening during childbirth, abortion or after injuries, while in other cases, which are milder, the infection is of a less virulent nature, as for instance depending upon blenorrhœa. Occasionally the disease may assume a mild form after childbirth or abortion, while in cases of blenorrhœa it may become very severe.

After normal or abnormal delivery, there is always more or less injury to the mucous membranes and other soft parts, which may become the cause of disease. The results of the injuries vary greatly. The most extensive injuries in the course of normal delivery, or caused by the use of clean hands and clean instruments, may have no serious consequences, and hardly produce febrile phenomena. There may be a deep laceration of the cervix extending to the parametrium, or even opening into the same, and only cause a slight infiltration into the adjacent tissues; or if a slight blood extravasation into the parametrium has taken place, the connective tissue may become extensively infiltrated; but the process runs its entire course in a few days, with only slight febrile disturbance, and may be only noticed on close examination. This is parametritis, phlegmone pelvis traumatica of Spiegelberg, which usually also accompanies local pelvic peritonitis.

More serious are the consequences in cases where the genital tract was injured, or where absorption of septic material from the inner surface of the same, as described by Semmelweiss, has taken place; the septic material may, in debilitated patients, be the result of self poisoning from a wound or decomposing ovum, or it may be introduced from without. (Infection.)

The most severe infections cause death without producing local symptoms; but a large majority of the cases which run their course, with more or less prominent local symptoms, accompanied by fever of greater or less severity, recover, but the changes produced in the pelvic peritoneum (adhesions between the organs, unyielding exudations into the parametrium) remain for months or years, and often cause prolonged illness of the patients.

The same phenomena may result from operations on the genital apparatus in non-pregnant women, such as incisions into the cervix, dilatations of the cervix with sponge tents, intra-uterine pessaries, internal medication of the uterus, or using sounds which have not been disinfected.

Symptoms and Course.—Inflammations of the different pelvic organs present the same symptoms at the beginning. There is no characteristic symptom differentiating between acute metritis, pelvic peritonitis or parametritis. They all begin with fever and pain in the pelvis and lower part of the abdomen. Only later in the disease do physical signs appear, which differ in the different organs. To illustrate well the difference in the phenomena, we will treat of acute pelvic peritonitis and parametritis separately.

Symptoms of Acute Pelvic Peritonitis.—Of all the inflammations of the pelvic organs, this one begins with the most violent symptoms. It may be ushered in with or without a chill, or with rigors. Violent after pains if the disease follows delivery or abortion, violent pains in the lower part of the abdomen if arising from any other cause, fever often with a temperature as high as 104° F., and tympanites appearing early, often limited to the lower part of the abdomen, or to one side, at times singultus and vomiting, indicate that the pelvic peritoneum participates largely in the disease. General peritonitis may follow on a pelvic peritonitis, and in 98 per cent. prove fatal. In many cases the disease is limited to the pelvis or extends very little beyond. Fever, pain, and tympanites often complicated by diarrhœa, last for one, two to eight days with the same severity, and only the decrease in the tympanites, which is soon followed by decrease in fever and pain, indicates a favorable termination of the disease. An increase and decrease of the dangerous symptoms may follow each other for days, and in rare cases for weeks, rendering the prognosis more unfavorable.

After localization of the process, the phenomena differ according as the inflammatory products are rapidly absorbed; or where they become enclosed by pseudo-membranes and form adhesions between the organs, remaining in a more or less liquid or hardened condition for a long time, or sooner or later changing into pus. In favorable cases, where the inflammatory products are rapidly absorbed, (the whole process may have lasted only a few days,) no changes can be appreciated, shortly after the termination, by palpation or bi-manual examination; but *post-mortem* findings teach us that these processes rarely occur without leaving adhesions.

If the process continues for a long time, with pain and fever, pseudo-membranes and adhesions are formed to a greater extent. Under such circumstances, tumor-like masses, more or less unyielding, may be felt through the abdominal walls in the course of a few weeks. These phenomena are produced by fixation of the intestines or agglutination of the same to the lower part of the abdominal wall, or by agglutination of the colon, mesentery, broad ligament, and other pelvic organs. By bi-manual examination it is found that the parametrium is not largely involved in the process, but the changes which can be felt through the abdominal wall, the displacement and fixation of the uterus and its appendages, are evident.

In cases of long duration, occasionally in a short time, the process results in an accumulation of exudative material in the spaces formed by the pseudo-membranes and adhesions, resulting in tumors. The most frequent seat of these accumulations is Douglas's *cul-de-sac*. They are not always situated in the median line, but may be formed at the sides of the uterus, extending through the inlet of the pelvis to one or the other iliac fossa. The formation of such encysted exudations is not of frequent occurrence, and if they are situated near the uterus, it is difficult to decide whether they are intra- or extra-peritoneal; but that such intra-peritoneal accumulations may occur, is well proved by *post-mortem* findings. The fever and pain sometimes subside after the formation of these masses, but the not well defined soft tumors may be felt unchanged for a long time through the abdominal wall. Sometimes fever is present from the beginning of the process, and this is due to the formation of pus. In other cases the encysted exudation is changed later into pus, giving rise to febrile symptoms, and in this way intra-peritoneal abscesses may be formed, which may perforate through the abdominal wall or intestine.

In acute pelvic peritonitis, the uterus and its appendages and the parametrium are usually involved. Inflammations of the uterus lead in rare cases to the formation of abscesses in its walls. The tubes, according to the nature of the infection, may become the seat of hydro- or pyosalpinx; the ovaries may undergo inflammatory swelling or suppuration.

Symptoms of Acute Parametritis.—This form of disease, in its early symptoms and etiology, is similar to pelvic peritonitis, with which it usually simultaneously occurs. The most acute septic varieties, which often result in rapidly developed purulent and necrotic changes of the cellular tissues, are usually accompanied by intense pelvic peritonitis. These instances we will not devote much space to, because they usually very soon terminate fatally, without giving rise to palpable changes.

In a large number of cases, which either are caused by a less intense infection, or are of traumatic origin, and run an unfavorable course, owing to the patient's debilitated condition, peculiar phenomena develop, which present a well-defined form of disease. These phenomena are mainly due to changes in the pelvic connective tissue, although it must be admitted that in most cases the other pelvic organs, especially the pelvic peritoneum, are also involved.

The disease is ushered in with or without a chill, but always with fever and pain in the pelvis. Frequently the disease, when occurring after childbirth, is indicated by severe after-pains and febrile excitement. Often too the disease is limited to one side of the pelvis. In the majority of instances, the left side of the pelvis is rather affected than the right, which is said to be due to the frequency of the first position in head presentations.

Often the pains appear suddenly. Usually they start from the uterus and radiate, according to the spread of the process, in different directions. In many cases the pains are limited to the uterus and its immediate surroundings. In a large majority of cases the pains extend outwards to one or both sides and are increased by motion. Occasionally they radiate to the lumbar region, and in rare cases there is painful micturition.

The duration of the pain and fever varies from a few hours to a week, or may even last several weeks, with occasional remissions. The intensity of the fever usually corresponds to the intensity of the process. In puerperal cases the fever usually begins during the first four days, more often during the first two or three days, rarely on the fourth or fifth day. The temperature is usually above 102° F., often 104° F., and in rare cases it may reach 106° F. According to R. Olshausen, in 70 per cent. of cases of puerperal parametritis and perimetritis, the febrile symptoms last eight days; in 20 per cent. fourteen days, and only in 10 per cent longer. With rise in temperature, the pulse becomes more frequent, and in some cases becomes accelerated only after the temperature has been elevated for half or a whole day. Usually it reaches from 100 to 120, and often for a short time from 130 to 140. Long-continued pulse rate from 140 to 180 occurs only in very severe septic varieties of the disease.

A day or two after the first attack of fever and pain the exudation into the pelvic cellular tissue can be felt as a bulky swelling by abdominal or vaginal examination. These swellings, that can be made out as belonging to the parametrium, by bi-manual examination, are the only characteristic symptoms showing that the disease has its seat in the parametrium. As a rule the extension of the exudation corresponds to the severity and duration of the fever and pain; but often an extensive infiltration into the connective tissue, takes place after fever and pain have lasted only one to two days. According to the site of the exudation, in the broad ligaments, round ligaments, or close to the cervix, the masses will be felt best through the abdominal wall or by the vagina. For the first few days the cellular tissue has a doughy feel, subsequently becoming harder.

The pain and functional disturbance depend upon the seat and extension of these hard masses. Of the functional disturbances are especially to be mentioned: frequent and painful micturition, retention of urine, tenesmus, irritability of the pelvic muscles, usually of the psoas and iliacus, irritability of and pressure on the nerves, which run from the pelvis to the lower extremities.

The symptoms of the acute form of the disease usually last from six to thirty days. In the most favorable cases the exudation may be absorbed without the formation of the characteristic hard masses. In this way doughy tumors of considerable size may disappear in a very short time. In less favorable cases the mass is absorbed only after it has become hardened, which of course requires a longer time, and this is not always completed.

Parametric affections resulting from operative interference and manipulation of the uterus, especially of the cervix in non-pregnant women, frequently run the same course.

This disease does not always run the same rapid and favorable course, but the process may have from the beginning a chronic insidious character, or the disease may be prolonged for weeks or months with intermissions, or the hard and bulky masses may remain for months or years in an unchanged condition, or smaller or larger pus centres form in the hard masses, or they change into an abscess.

In cases where the process has a chronic insidious character from the beginning, the symptoms are often so slight that they escape the attention of the patient. Frequently the patients come to the clinic from four to twelve weeks, or even longer after abortion or delivery. Usually they are anæmic and complain of protracted convalescence, loss of appetite, sleeplessness, occasional chilly sensations with slight fever and pain in the lower part of the abdomen, pelvis and thigh. On examination hard masses of exudation are frequently found around the uterus, usually conjoined with extensive laceration of the cervix. On close questioning it is found that during the first few days after delivery, there was slight fever, which was considered to be milk fever, and, as a rule, the patients recollected having had pain corresponding to the seat of the exudation.

In cases where the disease is prolonged for weeks or months, with occasional attacks of fever and pain, usually soon after the first symptoms, the result of the inflammatory process manifests itself, and corresponding to the seat of the inflammation, a tumor in the broad ligament on one or both sides, or a hard mass to one or both sides of the supra-vaginal portion of the cervix, is felt through the abdominal wall or vagina. After the first inflammatory attack the fever subsides, the pain ceases and the patient feels well for two to three days. Suddenly fever and pain reappear. The direction of the radiation indicates the course of the extension of the process. On examination it is found that the exudation extends from the broad ligament towards the iliac fossa, or from the cervix uteri laterally to the pelvic wall, and usually also anteriorly along the round ligaments and the abdominal wall. At first both fever and pain remit, but later the pain is constant.

The patients are confined to bed, and according to the extent of the disease the functional disturbances before mentioned appear. Irritation of the nerves causes great pain in and contraction of the hip and knee joints. These phenomena we have seen in patients one and a half to two and a half years after the beginning of the process, which was associated with vesico-vaginal fistula.

After the patient has apparently entirely recovered, all the symptoms may reappear, and even after the exudation has been absorbed on one side it may appear on the other, which phenomena we have seen in several patients where the process lasted for one to two years, without the formation of an abscess.

The seat, size and form of collections of exudation in the pelvic cellular tissue differ greatly, and we will attempt to give an account of the most frequent varieties.

The most frequent seats of these exudations are the sides of the uterus, which give attachment to the broad ligaments; the infiltration is triangular, half as large as the fist, having its base at the uterus and its apex between the layers of the broad ligament. This variety is frequently observed in connection with laceration of the cervix, or operations on the uterus in non-pregnant women. Through the relaxed abdominal and vaginal walls during the puerperium, the exudation may be felt by careful conjoined examination to the sides of the usually sub-involuted and more or less fixed uterus, extending in the direction of the broad ligaments. If the process is only on one side, the uterus is pushed to the opposite side. This variety usually runs a favorable course.

Another variety is a tumor from one to two fists in size, irregular in shape, situated in one or both lateral ligaments, smaller in size at the side of the uterus, and also diminishing towards the pelvic brim. The tumor is more readily felt through the abdominal walls than the vagina. The uterus is pushed to one side, and fixed to a greater degree than in the preceding variety

The next frequent form is where the exudation extends from the uterus and broad ligaments to the iliac fossa, and can be perceived by inspection. It is to be mentioned that the exudation may be very slight in the broad ligament, is on the road towards absorption, when the tumor in the iliac fossa is still quite large. This is important as it shows the connection of abscesses, formed late in the disease, with the uterus, although remote from and apparently independent of it.

Further, we meet with an unyielding irregular mass surrounding the cervix, and extending towards the sides of the pelvis anteriorly along the round ligament to the anterior pelvic and abdominal wall. Thereby the uterus is displaced to the opposite side and rendered immovable.

The portion of the uterus, then, which is situated in the parametrium, is surrounded by masses of exudation, and the greater part of the pelvis seems as though it were completely filled with these hard masses. The uterus, which is wedged in on all sides, seems to be situated deeper, the anterior and posterior fornices of the vagina seem to be obliterated, and are often pushed downwards by the masses of exudation. The exudation often forms a hard ridge nearly in or below the middle of the pelvis, which may be felt through the vagina. The findings through the abdominal walls differ according to whether the exudation extends high up towards the broad ligament, the iliac fossa, anterior abdominal wall, or if it is limited to the cervix uteri. In the first case we find the tumors already described, in the latter the result of the examination through the abdomen is negative. In both cases the exudation is found to extend to the point of attachment of the round ligament to the inguinal canal, and we find above Poupart's ligament an unyielding site curved upwards, which by bi-manual examination is found to be a prolongation of the deeper situated masses

Of rarer occurrence is the extension of the exudation from Poupart's ligament to the sub-peritoneal cellular tissue of the anterior abdominal wall, but occasionally flat masses, sometimes as large as the hand, are found in this region. Just as rare is it to find the surroundings of the uterus entirely free, and an exudation on the sides of the pelvic wall extending through the broad ligaments towards, but not to the uterus. Extension of the exudation downwards from the cervix uteri, and its limitation to the same, is also rare; but sometimes we find, more often along the posterior than the anterior wall, exudations extending to the orifice of the vagina.

The very large hard masses remaining unchanged for months or years are found in a minority of cases, either following childbirth, or operative interference with the uterus or vagina. After the fever and pain subside, the mass of exudation may retain its irregular shape or assumes a more rounded form through partial absorption. These masses, according to their seat and size, may cause slight pain only, aggravated at times especially during menstruation, or they may become a source of constant suffering to the patient without confining her to bed. The following cases may be instanced: A woman, who for five years had a large mass at the anterior and lateral pelvic wall extending to the enlarged uterus, and between it and the bladder, came to the clinic, and without special treatment the tumor disappeared in the course of two years. In a few other cases, where, on account of the long unchanged standing of masses of exudation, neoplasms were suspected, we at last saw the swellings diminish in size and almost entirely disappear. The most prolonged case that we saw lasted for twelve years

In cases where smaller or larger pus centres are formed in parametric exudations, this usually occurs early in the disease, rarely later. The formation of pus may be suspected when long-continued fever is present, at first slight, becoming more severe later, or when chills and rigors occur. *Post-mortem* findings, and the course which many cases run, indicate that pus centres may form during life, and be absorbed without evacuating into neighboring organs. The finding of pus centres which have apparently existed for a long time, and the retrogressive changes which the same have undergone—further, the recurrence of chills and fever without an extension of the exudation—will make it evident that from time to time pus has entered the circulation. This is proved by another fact to be mentioned later.

Smaller pus centres usually evacuate themselves through a laceration in the cervix, which most probably was the starting-point of the process. Without previous symptoms of suppuration, small quantities of pus often quite suddenly escape through the vagina. The discharge of pus may last for several days or may for weeks with occasional interruptions. By digital examination the opening is usually not found, but by the aid of a speculum we have several times seen it in a laceration of the cervix.

The next most frequent point of evacuation is above Poupart's ligament. In this locality the pus usually appears after the fever has lasted from three to six weeks. This region becomes painful and hard; later we find small soft spots that pit on pressure, then appears a circumscribed elevation in the course of Poupart's ligament, the centre of which becomes softened. Finally the skin over the ligament, usually at its centre, ruptures, and a smaller or larger quantity of pus is evacuated, at times in more than one place.

Only part of the mass of exudation degenerates, and after the discharge of pus, it is only slightly diminished in size.

Absorption may take place even after pain, elevation, and reddening about Poupart's ligament have occurred, and this fact proves that, as we have already stated, fully developed pus centres may be absorbed.

The course of cases that evacuate at Poupart's ligament is usually favorable. The discharge of pus, which gradually becomes thin and finally serous, lasts from one to two weeks; but even this variety may run a tedious unfavorable course, with the formation of sinuses.

Other rupture sites are rarely seen, and then only very late in the disease, in which case the pus cavities exist for a long time, on account of being remote from the point of perforation. Several times we have seen pus escape through the sacro-sciatic formen, in which cases the superior and inferior borders of the gluteus maximus were perforated. In one case where the vesico-vaginal septum was implicated, the opening closed only after fifteen months, in another case only after two and a half years.

We have often seen pus centres gradually discharge through the bladder, without giving rise to special pain. The presence of large quantities of pus in the urine, and a frequent desire to micturate, called attention to it. Nearly as often the pus escapes in large quantities through the rectum accompanied by diarrhœa.

Rarely does a parametric abscess rupture at a point higher up in the abdominal wall. Cases where sub-peritoneal abscesses evacuate near the navel, as mentioned by Leopold and Lomer, are very rare; as also are the cases where an abscess evacuates through the quadratus lumborum, as reported by Meinert; still more rare is the evacuation of these abscesses through the perineum or labia majora. Very rarely it is observed that while the surroundings of the uterus are free, suppuration takes place in hard masses remote from this organ. The masses remaining in the psoas and iliacus often undergo suppuration very late, constituting the so-called ilio-psoas abscesses, and they usually evacuate under Poupart's ligament.

Most of the cases in which the pus escaped through a single opening, although often lasting for a long time with severe consequences, terminated in recovery. There are other cases where pus centres form in different portions of large masses of exudation, communicating with each other by sinuses, and here rupture usually occurs through more than one opening; occasionally one of these openings may become closed, the symptoms abate, and it seems as though recovery would take place, but soon new perforations occur accompanied by hectic fever, leading to a fatal termination in spite of surgical treatment. In a few cases, of which only one terminated without contraction of the hip joint, we saw the patients succumb after the lapse of one to four years from the beginning of suppuration. In the case that lasted four years, several perforations occurred above and below Poupart's ligament, others between the anterior superior and inferior spines of the ilium, one at the lower border of the gluteus maximus, and in the course of the disease the bladder and rectum became also perforated. In spite of the large amount of pus evacuated daily, there were not found on examination extensive pus cavities, but the whole left side of the pelvis was filled with hard masses, which extended to the iliac fossæ, and these masses were invaded by smaller or larger pus centres, which communicated with each other as well as externally. In another instance, with a large amount of pelvic exudation, several perforations occurred, and in the course of the disease a portion of intestine became adherent to the abscess wall, and was perforated so that fæces escaped with the pus just below the anterior superior spine, and the patient died after the process had lasted for a year. Less frequently large abscesses are formed in the pelvic cellular tissue, and when they are they may give rise to no marked fever or seriously impair the health of the patient. But the pus extensively destroys the soft parts of the pelvis, involving its muscles and bony wall.

Another very rare form of the disease, which rapidly terminates in death, is that in which suddenly, without appreciable cause, perhaps by infection through surgical manipulations, decomposition of the pus takes place. Cases of this kind never came under our observation. Olshausen, who observed such a course in abscesses of the iliac fossa, thinks that the gases which diffuse from the neighboring rectum cause decomposition in the originally healthy pus. The patients die from exhaustion or rapidly with symptoms of septicæmia. In rare instances intraperitoneal and parametric abscesses are caused by actynomykosis as in a case of Billroth's clinic described by Hacker.

Diagnosis of Acute Pelvic Peritonitis.—It is ushered in with the same grave alarming symptoms as general peritonitis. High fever, marked tenderness on pressure over the abdomen, the adjacent sub-peritoneal connective tissue being almost always at the same time involved, early tympanites, which is partial and limited to the lower part of the abdomen, more severe on one or the other side, these symptoms indicate that the peritoneum largely participates in the process. The starting-point of the pain, the spot of greatest tenderness, indicates the locality where the disease is most intense. With these first violent symptoms an extensive parametritis may simultaneously exist; but high fever tympanites and great tenderness are sure indications of the presence of pelvic peritonitis. Only after a few days, when the pain has subsided, can we by vaginal examination—a thorough bi-manual examination may be harmful to the patient—and palpation of the connective tissue in all directions make sure that the pelvic connective tissue is not diseased, and that only the peritoneum is affected.

In many cases we must rely on the first symptoms to make a diagnosis, for in a large number of cases no palpable exudations take place.

The presence of fluid exudation can not always in acute cases be diagnosed by changing the position of the patient, since the exudation is small, or if large it is encapsulated. In passing we will mention that in acute general peritonitis these phenomena are also rare, but they frequently accompany chronic cases where larger areas of the peritoneum are involved, although accompanied by but slight febrile disturbance.

The diagnosis is greatly facilitated by the presence of the palpable changes which generally occur in the course of pelvic peritonitis, enabling us to determine the extent of the process; and, in doubtful cases, where the pelvic connective tissue is also affected, we often are able to decide whether and to what extent the pelvic peritoneum is involved. It is not always easy or even possible to decide whether a tumor is intra- or extra-peritoneal, for if peritoneal exudations are enclosed between adhesions near the uterus, it is quite impossible to distinguish them from extra-peritoneal. Only under quite definite conditions can a positive diagnosis be made. These conditions we will try to describe.

The tympanites in case of pelvic peritonitis is often limited to a few convolutions of the intestines near the pelvic inlet or iliac fossa. Just at these places we notice later in the disease points of resistance or swellings, which are produced by adhesions formed between convolutions of intestine, parts of the broad ligament, cr the uterine appendages. In case we can determine the presence of masses near the pelvic inlet, in most cases laterally, it is quite certain that they were caused by pelvic peritonitis. In the beginning tympanites is usually present in some part of the unyielding spot, and this will prevent us from mistaking the exudation for tumors situated high in the broad ligament. Later it is observed that these swellings change their seat with distension of the intestine or bladder, and the area of tympanites also changes, which can readily be ascertained by marking the borders of the swelling daily. Further, we may diagnosticate with certainty as intra-peritoneal, swellings which become rapidly encapsulated by large masses of exudation behind or at the side of the uterus, protruding far over the pelvic inlet. Where tumors are formed in Douglas's *cul-de-sac* and do not protrude over the pelvic inlet, or when they are situated in the iliac fossa, it is difficult to determine whether they are intra- or extra-peritoneal. The diagnosis may be assisted by remembering that intra-peritoneal swellings remain soft for a long time, while exudations into the meshes of the sub-peritoneal cellular tissue rapidly harden and may be palpated.

With less certainty can the anatomical seat of resistant spots in the anterior abdominal wall near the pelvic inlet be determined as exudations into the sub-peritoneal cellular tissue, since they present the same phenomena as those which are intra-peritoneal.

Diagnosis of Acute Parametritis.—The initial symptoms are as a rule not as violent and alarming in inflammations involving chiefly the para-uterine cellular tissue, as those of pelvic peritonitis. Fever and pain may be as intense as in pelvic peritonitis, but tenderness and tympanites are absent in the beginning of the disease. Severe pain on pressure is produced only when the uterus is moved or its sides touched. There are cases, particularly those where the exudation rapidly extends towards the inguinal region or the iliac fossæ, in which tenderness is present early in the disease, similar to pelvic peritonitis.

The starting-point of the pain and its distribution, the locality of greatest tenderness, indicate the seat of the process, its intensity and extent.

With such initial symptoms usually the pelvic cellular tissue is chiefly involved, but the diagnosis is made certain only by the presence of the inflammatory products. As the swellings do not always reach to the abdominal wall, palpation is more reliable than percussion to determine their presence.

If a day or two after an attack of fever and the appearance of the described initial symptoms, the uterus is found enlarged transversely in the region where the broad ligaments leave it, parametritis certainly exists, and it is hardly necessary to prove it by bi-manual examination. If after fever has lasted for several days points of resistance are found over Poupart's ligament corresponding to the previous seat of pain and tenderness, or if swellings have formed above or extend to the centre of Poupart's ligament, or internally to the anterior superior spine of the ilium, the convex border of which is readily felt or even seen, or if by firm pressure of the abdominal wall tumors corresponding to the broad ligaments are found, then it is also certain that the process involves the parametrium. If still doubtful the diagnosis may be confirmed by vaginal examination, which in most cases will reveal the presence of large masses at the sides of the uterus, extending anteriorly or laterally to the pelvic wall, or filling one side of the pelvic cavity, showing clearly that the swellings felt through the abdominal wall are masses of exudation extending below the peritoneum.

If under these conditions the vagina is movable in every direction, and the lower part of the uterus is free, we must take in consideration that there are exceptional cases where the exudation begins high in the broad ligament, extending towards the iliac fossæ and the lumbar region, but in such cases the diagnosis is uncertain, for it is impossible to determine whether a tumor, which developes high in the broad ligaments, and extends in different directions, is intra- or extra-peritoneal.

In some cases the exudation may not be felt at all through the abdominal walls, for in many instances the inflammatory process is limited to the deeper regions of the pelvis, and the diagnosis can only be made by vaginal examination.

If with more or less severe inflammatory symptoms, masses form in the neighborhood of the cervix, or extend to the deeper portions of the pelvis, being doughy and soft at the beginning, but rapidly becoming harder, or if large well-defined swellings form in the true pelvis in front or behind the uterus, the process can be none other than phlegmonous inflammation of the cellular tissue.

The diagnosis of suppuration and the formation of abscesses in the pelvis is usually not difficult. It is to be remembered, however, that abscess caused by caries of the spinal column or pelvis may also involve the parametrium. If with continued or interrupted fever we find fluctuating points in the masses of exudation, or if with the same phenomena the swelling rapidly increases and becomes soft, the diagnosis is certain; but in many cases, where the swellings are large, it is difficult or even impossible to decide whether the process is intra- or extra-peritoneal. The decision is indeed of little practical importance, as intra-peritoneal abscesses become shut off from the abdominal cavity.

Fig. 21, from a *post-mortem* by Prof. Klob, illustrates how extensive this process may become. The patient, aet. thirty-seven years, dated her disease back nine months, and died from cancer of the uterus, during the course of which a large pelvic abscess formed.

The tumor extended upwards as far as the right kidney, involving the renal artery and vein, and downwards to the ischium, denuding the sacrum, and perforating the acetabulum, so that the head of the femur projected into the abscess cavity; the neighboring parts were covered with cheesy, friable, light-brown and easily removable vegetations.

Treatment.—To prevent peri- and parametritis antiseptics should be thoroughly used during labor, after delivery, and in case of all operations and manipulations on the vagina and uterus.

The treatment of both forms in most respects is the same, but differs according to the stage.

In the acute stage the object is to limit the local inflammation and exudation that takes place in the pelvis, which is best accomplished by antiphlogistics.

Venesection, in former times so highly recommended, is at present abandoned; but local blood-letting has even now many advocates. Scanzoni recommends for this purpose the application of ten to twelve leeches to the region where the symptoms are most pronounced. After the first two weeks following child-birth, or in processes independent of the puerperal state, he recommends the application of leeches to the vaginal

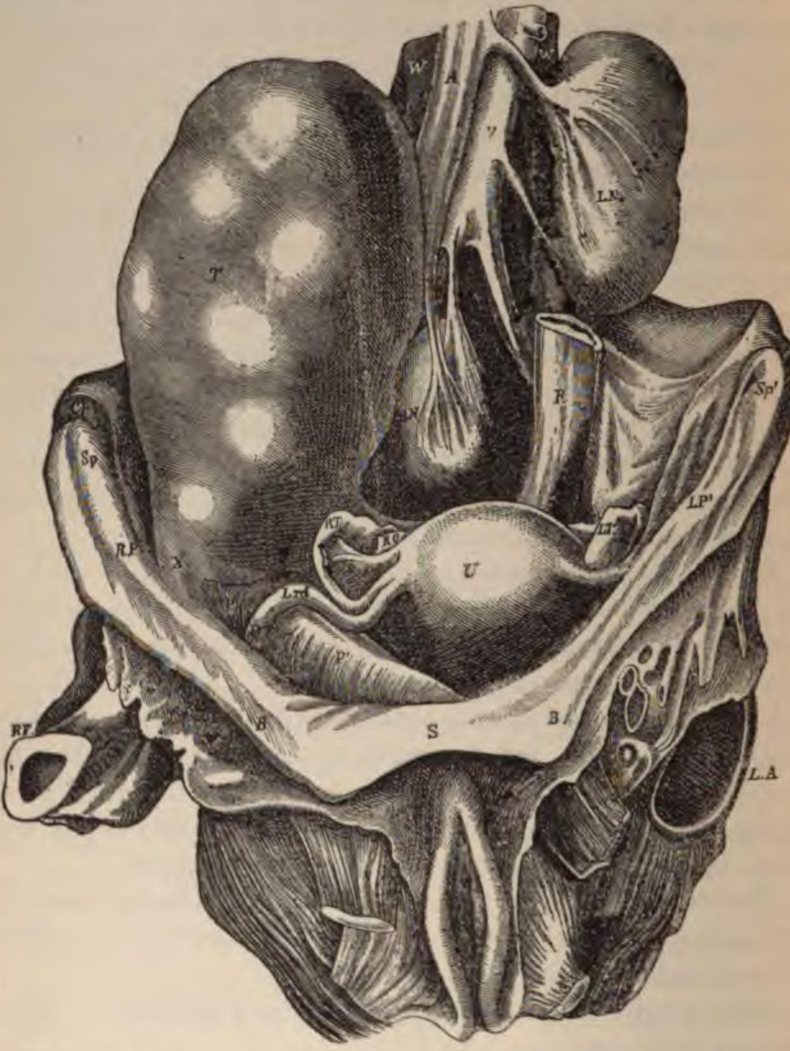


FIG. 21.—SUBPERITONEAL PELVIC ABSCESS. *RN*, right kidney; *LN*, left kidney; *R*, rectum; *U*, uterus; *RT*, *LT*, right and left tubes; *Lrd*, right round ligament; *E*, insertion of the same; *Rp*, reflection of the peritoneum; *PP'T*, abscess cavity; *X*, lifting off of peritoneum by pus. (After *W. Schlesinger.*)

portion. Olshausen and Spiegelberg also recommend the application of leeches to the inguinal region and vaginal portion.

Our own experience is limited to the comparative observation of a great number of cases at the maternity clinic of Vienna. In Prof. Späth's clinic ten to twelve leeches were always applied to the inguinal region in puerperal diseases with manifest local symptoms and very violent pain in the pelvis, while in Prof. C. Braun's clinic blood-letting was never practised in puerperal cases. This experience proved beyond doubt that local depletion markedly relieved the pain; but it is difficult to decide whether the extension of the local process was favorably influenced by it. In non-puerperal cases of a marked local nature, especially where the cervix or the whole uterus is involved, we make use of scarification or the application of six to eight leeches to the vaginal portion, and repeat this procedure if necessary. The hyperæmic tense appearance of the vaginal portion in these cases vouches for the usefulness of this procedure.

Application of ice is especially useful in the acute stage of pelvic peritonitis. We have only seen good results follow this treatment. The patients soon feel relief from their pain and ask that the application be repeated. Absolute rest is of the greatest benefit in the acute stage. We usually elevate the knees of the patient, protect the abdomen by hoops, and cover the same with from four to six thicknesses of damp cloth upon which a moderately heavy ice-bag or Lister's ice-coil is placed. In this way we have often continued the application day and night for several days.

In cases where there are no impacted fæces, we prevent peristaltic movements of the intestine with opium or morphine. In the beginning of the disease, if we suspect impacted fæces, we try to move the bowels by enemeta of tepid water. After such a procedure the patient sleeps for several hours and awakes refreshed.

Even after subsidence of acute symptoms it is advisable to direct the patient to keep quiet, and provide for regular and liquid stools, for it is often observed that after exertion or difficult defecation the acute symptoms recur; and, it should be stated, this may happen even with perfect rest in bed.

Only mild cathartics should be used in these cases, as salines, rhubarb, castor oil, etc.

Many physicians claim good results from rubbing the lower part of the abdomen and the inner aspect of the thighs with blue ointment. We have often applied this remedy combined with opium or morphine, without favorably modifying the course of the disease. Many English physicians expect good results from blistering the abdominal wall once, or repeatedly. Bernutz advises abstention from local depletion during the acute stage, and to blister the whole abdomen. Courty also is convinced of the efficacy of this remedy. Wet cups are also recommended by some. We have never tried either.

Chronic Exudations.—In a large number of cases, attended by a slight fever in the beginning, and in which only small masses of exudation form in localities corresponding to lacerations of the cervix, treatment is hardly necessary. After the violent pain subsides we apply, instead of cold, moist heat (Priesnitz's compress), and keep the bowels open. Often in from ten to fourteen days the exudation masses disappear. If this should not happen, we must resort to resorbents. With the continued use of Priesnitz's compresses we order sitz and warm baths (92 to 94° F.). Baths are of advantage when there is no pain in the pelvis, on walking, and when absence of fever shows that the acute process has terminated. By the early use of the bath we have frequently observed return of the acute stage and extension of the exudation.

In chronic cases with long-continued fever, pain and extensive exudation in all directions, no benefit can be derived from baths and resorbents. In these cases tonics, good nourishment and attention to hygiene are indicated.

In cases where large masses remain unaltered for months or years we resort to the same treatment. Locally we treat these cases with tepid and warm irrigations of the vagina. The patient lying on her back has from one to four quarts of water injected into the vagina, beginning with a temperature of 92 to 94° F., raising it every third day 3° F. until from 108° to 110° F. is reached. When a higher temperature is used slight pain frequently follows the irrigation, in which case we tell the patient to remain quiet on the back for one to two hours. Under these conditions the vagina becomes tense, and by digital examination we feel that with the tension there is contraction. According to our idea the douche acts as a mild massage. The mechanical pressure and the contraction of the tissues, which often extends to the uterus and its surroundings, have the masses of exudation in more intimate relation with the circulation, and in this way absorption is promoted.

Iodine and its preparations are frequently used. Suppositories made of cocoa butter, containing from forty-five to seventy-five grains of iodide of potassium, may be advantageously inserted into the vagina. Others prefer applications of glycerine and iodide of potassium tampons, or sponges medicated with the same, or the use of iodide of potassium ointments, or iodoform liniments, applied to the abdominal walls or to the cervix. Some authors also recommend iodide of potassium internally. Although, shortly after the application of iodine to the vagina it appears in the urine, we are not convinced that it promotes absorption of the exudation; but when there are abraded surfaces on the cervix its application is very useful. Prof. Breisky of Prague introduced the following treatment which has been advocated by Johannowsky: He paints the vaginal portion, and the entire vault with concentrated tincture of iodine through a cylindrical speculum every third day, and assists absorption by vaginal irrigations of tepid water and warm abdominal compresses, under which is a coating of tincture of iodine.

The use of mineral waters containing iodine and bromine has an appreciable influence on the disappearance of these exudations and on subinvolution of the uterus.

We must mention here the treatment for diseases of the female genitals commonly known as "Thur Brand's uterine-gymnastics," also practised by Oskar Nissen and described by Chrobak.

This treatment does not suit cases attended even by the slightest amount of fever, since this is an indication of a still active process, in which case massage will do harm. Its application is useful only in cases where fever has been absent for a long time, and hard masses of exudation cause severe pain to the patient for months or even years, making life a burden.

Opening of Intra-Peritoneal Abscesses.—The formation and encapsulation of serous or sero-bloody exudations occurs frequently in the course of pelvic peritonitis. The most frequent seat is Douglas's *cul-de-sac.* The exudations are either separated from the peritoneal cavity by pseudomembranes or by convolutions of intestines matted together, or they communicate by sinuses with cavities situated between the intestines or along the abdominal wall. Now and then large spaces containing exudation have their seat above the pelvic inlet, and when existing for a long time without fever, may be confounded with ovarian cysts.

The opening of such exudations is indicated when their contents become purulent, producing high fever and endangering life; or when there is present violent pain situated near the surface.

Incision of abscesses situated in Douglas's *cul-de-sac* is especially risky and quite simple. The relation of the mass to the bladder and rectum must, of course, be ascertained before the operation is performed. When in doubt of the contents an exploratory puncture should be made.

If the contents are of a sero-sanious nature a simple puncture with a medium-sized trocar and evacuation of the fluid will often suffice, without the use of an aspirator, to effect a cure.

When the contents are purulent it is better to make a free opening that will easily admit the finger. If the wall that separates the abscess from the vagina is thin we may by using Sims's speculum incise it with a bistoury at the most prominent point and enlarge it with a blunt-pointed bistoury. When the wall is thick it is advisable to open it layer by layer, in order to be able to control hemorrhage or to avoid the ureter when the incision is made high up. To facilitate the evacuation of the contents, and for washing out the cavity with a two to three per cent. solution of carbolic acid, it is advisable to introduce a glass or rubber drainage tube.

Large abscesses projecting into the abdominal wall can be opened through these walls, and if they communicate with an abscess in Douglas's *cul-de-sac* it is advantageous to pass a drainage tube from the abdominal wall into the vagina. In this way A. Hegar opened an abscess in the linea alba successfully.

Incision of Parametric Abscesses.—Authorities differ as to whether it is better to open these abscesses early or wait for a spontaneous opening. These different opinions result from the fact that some authors made their observations on the more frequent smaller pus centres in hard masses of exudation, while others dealt with the rarer large pelvic abscesses. Scanzoni, C. Braun, M. Duncan, Schröder and others are not in favor of early opening of these abscesses, which principle is correct according to our experience with abscesses originating in hard masses of exudation in the pelvic cellular tissue; because it is frequently observed that these masses become absorbed after having caused circumscribed redness or even bulging over the outer half of Poupart's ligament. Another reason is that the pus centres are often remote from the surface and only occupy a small space in the mass, and can be detected only by inflicting serious injury, which would be justifiable only if we were certain that the whole mass of exudation would rapidly undergo suppuration and evacuation after opening the abscess; but as it often happens that comparatively small collections of pus, which open spontaneously, soon become closed, and the major part of the hard mass has to undergo absorption, it is more practical in such cases to allow the pus to reach the surface and perhaps to promote this by poultices.

If these abscesses after becoming superficial do not open spontaneously, or if there is reason to believe that they are the cause of severe fever, septic poisoning or extension of the inflammatory process, we should not hesitate to open them.

Surgical interference is indicated in all cases where it is evident that large abscesses have formed in or about the pelvis. The treatment is the same whether they originate in the peritoneum or parametrium, for in large abscesses it is practically impossible to distinguish between the two forms. It is best to open them where they approach the surface and where the pus can have a free exit. If the abscess bulges into the vagina it can be opened there, but we should avoid opening them through the rectum, because, besides the fact that fæces may find their way into the abscess cavity, the after-treatment is more difficult. On the abdomen we should evacuate below the point of reflection of the peritoneum—that is to say, a little above and external to the middle of Poupart's ligament.

A. Hegar has for some time endeavored to treat surgically at an early date even deep-seated parametric abscesses. He proposed in suitable cases to make an incision over Poupart's ligament, push the peritoneum to one side, and go down deep outside of it along the horizontal ramus of the pubis. In this way it is easy to reach the side of the bladder and base of the broad ligament. Hegar has also tried to find deep parametric abscesses through the ischio-rectal fossa. After dividing the skin and superficial fascia from the tuberosity of the ischium to the tip of the coccyx, the finger can easily penetrate through the loose adipose tissue to the inferior and external surface of the elevator ani, and from thence with a little more difficulty to the seat of the parametric abscess.

Prognosis.—In order to reach a prognosis in inflammatory diseases of the pelvic organs it is necessary to consider their etiology and the severity and duration of the ushering-in symptoms. If the disease occur in childbed or follows operations on the genital tract of non-pregnant women, and if it is accompanied by a continued frequent pulse (140 to 160) and a temperature of from 104° to 106° F., and a peculiar changed expression in the face, indicating that severe constitutional disturbance is present, the process is usually caused by intense infection and the prognosis is as a rule unfavorable. Although the severer symptoms of septicæmia are absent, the prognosis is doubtful when the pelvic peritoneum is involved, becoming more grave in proportion to the range of the fever, tenderness and tympanites. With these symptoms the patient may recover in from six to ten days, or die within the same time from general peritonitis. A favorable prognosis as to recovery may be made in cases where the peritonitis is limited to the deeper portion of the pelvis, or to the coverings of single organs, or if the process is subacute from the beginning. These cases are not attended by high fever, tenderness or tympanites.

The longer the process lasts, and the higher the temperature, the more serious are the consequences If of short duration it may leave no trace, but if of long standing the patient may become an invalid for life. When lasting from six to fourteen days the prognosis as regards life may be favorable, although adhesions between the uterine annexa and the abdominal wall may have formed. The longer the inflammatory process lasts the more probable it is that the uterus, ovaries, Fallopian tubes and the sub-peritoneal connective tissue participate in the disease. The more organs involved the more serious the consequences.

The most favorable prognosis in every respect can be made in cases attended by fever only from two to four days, and in which the pelvic peritoneum was only slightly involved. The mass of exudation in these cases may become absorbed in from eight to fourteen days, and the patients entirely recover.

The formation of pus centres in hard masses of exudation, and the formation of external sinuses do not render the prognosis unfavorable; on the contrary it is frequently observed that in these cases the hard masses of exudation become more rapidly absorbed. Also when these masses suppurate and form abscesses which are evacuated spontaneously or artificially the prognosis is about the same. On the other hand the prognosis is very unfavorable in those fortunately rare cases where, in extensive masses of exudation, pus centres and fistulæ extend in every direction, and evacuate by multiple openings. Many of the patients succumb from long-continued suppuration.

CHRONIC PELVIC PERITONITIS AND PARAMETRITIS.

We are well aware of the fact that the denomination that we use for these affections is not quite exact, for they also may be acute at the beginning and of short duration.

These so-called chronic forms, since they are usually of gonorrhœal or catarrhal origin, might well be called the gonorrhœal, but they are often met with in cases where this cause can apparently be excluded; they might also be called "relapsing," although often the process does not recur. Since, however, it is necessary to distinguish between these cases and the severer forms of puerperal disease, we call them "chronic" on account of the frequently recurring relapses.

As these forms of pelvic peritonitis and parametritis are identical in etiology and course, it does not seem advisable to treat of them separately, but it is only necessary to occasionally point out their differences.

Etiology.—The most frequent cause of these forms of peri- and parametritis is, as stated by Noeggerath, in connection with pelvic peritonitis, gonorrhœa. The more we observe, the more we are convinced of the great influence the specific virus has in the production of these diseases. We must now admit that husbands apparently cured of gonorrhœa, and all the more where the meatus is occasionally agglutinated in the morning, or where there are traces of discharge in the urine, may infect their young wives.

Not only the true blennorrhagic virus, but also its less virulent varieties, such as those giving rise to vaginitis in children, and mild conjunctivitis in infants, and possibly other infections, may cause the chronic form of para- and perimetritis. Infection from dirty fingers, cloths or sponges, contact with persons suffering apparently from simple catarrhal affections, have, according to our experience, frequently caused these affections.

According to the virulence of the poison, the first local symptoms vary. If not due to a true virus, it is rare that the entire vagina should become diseased, but only the tender mucous membrane of the cervix, the meatus urinarius, and the mouths of the glands at the introitus, there being present a more or less catarrhal process. From the mucous membrane of the cervix sooner or later the affection extends to the walls of the uterus and its surroundings, especially the lateral and posterior, and thus by the lymphatics to the tubes and ovaries, where it is frequently observed as perisalpingitis and perioöphoritis.

This extension of the disease can be traced easily in the genitals of individuals who have not given birth to children. We demonstrated this fact from a number of specimens at a meeting held in Freiburg in 1883.

In women who have borne children, this form of inflammation occurs usually after they have suffered several times from inflammatory disease which has caused permanent injury to the uterus and its surroundings. Such uteri usually are more or less fixed, and frequently eversion and erosion of the cervix and endometritis are present, predisposing to injection.

The disease is more apt to occur during menstruation. at which period also relapses are more frequent.

The chronic form of the disease at times developes from abraded or ulcerating portions of the vagina or cervix. Wounds caused by pessaries or from friction in cases of prolapsus, are frequently the beginning of the process.

These forms, especially pelvic peritonitis with slight exudation (adhesive pelvic peritonitis), frequently accompany the development of cysts, carcinoma and other neoplasms, and also hematocele, long-standing hematometra, and extra-uterine pregnancy.

Para- and perimetritis do not always originate in the genital tract. Often the inner surface of the rectum, which may be impacted with fæces and irritated, becomes the starting-point of the disease. Peritonitis is often produced in this manner during pregnancy and the puerperium, as also apart from these conditions. We have seen two cases not associated with parturition in which an infiltration into the cellular tissue surrounding the cæcum extended to the broad ligaments, forming there a large tumor. It is also probable that the affection has at times its origin from an infected bladder.

Symptoms and Course.—During life instances are best observed in prostitutes and nulliparæ; while in women who have given birth to children, the changes are obscured by pathological alterations resulting from previous inflammations.

Frequently this form of the disease presents no marked symptoms at the beginning. We often find clinically in girls and young women, applying only for advice on account of leucorrhœa or irregular menstruation or sterility, smaller or larger swellings, adhesions between tubes and ovaries and their surroundings, and yet the patients can give no history of antecedent inflammatory trouble, or on points bearing on the onset of the affection.

In the majority of cases the patients will, however, recollect, when questioned, that years ago they had suffered from inflammation of the womb for a longer or shorter time, enabling us to diagnosticate the primary seat of the affection.

In many cases the patients report that suddenly or gradually, usually at the period of menstruation, during which the mucous membrane is more prone to infection, pain in the neighborhood of the uterus, without or with slight fever, set in. Further we learn in many cases that since the first symptoms the menses have become altered, prolonged and more frequent, sometimes that there has been irregular bleeding, that leucorrhœa was nearly always present, later dyspareunia and in a few months dysmenorrhœa had developed.

Now and then the pain, especially in the ovarian region, is severe, accompanied by slight fever, and the patients are confined to bed for one or several weeks.

This form of disease, with a painless or painful course, is most frequently observed in prostitutes (the so-called colica scortorum), and the resulting pathological changes, together with endo-cervicitis, are as a rule, the cause of their sterility. This condition is so frequently observed in prostitutes that I once believed that with shut eyes, by bi-manual examination, they could be identified, but by more extended practice I learned that the same condition, usually less intense, might exist in girls and very frequently in sterile women. We have often had occasion to follow the whole course of this disease, beginning in the cervix and extending especially to the neighborhood of the tubes and ovaries, in recently married women (see Figs. 22 to 25).

Judging from the latter symptoms during life, and from the *post-mortem* findings in women who have given birth to children, peri- and parametritis frequently occur in the described form after parturition and abortion, running their course without or with slight pain and fever, lasting only a short time.

In women who have once suffered from inflammatory disease of the genital tract, especially after parturition or abortion, the course of this form of disease cannot be closely followed. The first symptoms of relapses are usually observed by the existing pathological changes in the pelvic organs. Gradually the symptoms reappear, pain during intercourse, micturition, defecation; the surroundings of the uterus are sensitive, and often fever is present. After a few days rest in bed, the symptoms of inflammation disappear, but the old symptoms are aggravated for some time. There are cases in which the patients are confined to their bed for weeks. Frequently the disease seems to have terminated, but suddenly it reappears and a condition of sickness and tolerable health alternates for years.

Diagnosis.—If symptoms are present at the beginning of the disease, the diagnosis is easily made by the local pain in the uterus and its surroundings.

In girls and sterile women we can diagnosticate this disease when during the menstrual period, or at any other time, with or without fever, there exist deep-seated pain in the pelvis and more or less tenderness over the lower portion of the abdomen. If the symptoms are, as is usually the case, confined to one side, the process is most probably present in the form of a perisalpingitis and perioöphoritis.

If the symptoms appear in patients who have suffered before from pelvic inflammation, it is simply a relapse which, as shown by *post-mortem*, runs its course most frequently in the pelvic peritoneum.

The exact seat of the affection is as little to be determined at the beginning as in the acute form of the disease. Only after the one or the other inflammatory process has run its course are we able to diagnosticate the tissue involved by the changes which have taken place in it. By examination, we recognize by the density of the cervix, its dilatation, its limited range of movability, its change of position and fixation, the dislocation of the ovaries or the tubes, that the inflammatory process has affected, in particular, certain of the surroundings of the uterus.

After many apparently normal deliveries, we may be able to diagnosticate a para-perimetritis. The cervix in these cases is frequently fixed in consequence of lacerations and cicatrizations.

The treatment is the same as in acute inflammations which have become chronic.

Parametritis Posterior.—B. S. Schultze has applied this name to a form of the disease where the inflammatory process has extended from the cervix along the recto-uterine ligaments involving the surrounding connective tissue and peritoneum. He describes it as follows: A very frequent finding, one which I claim as the most frequent cause of permanent pathological anteflexion of the uterus, is the shortening and hardening of the folds of Douglas. If a finger is passed in the rectum or vagina behind the posterior surface of the uterus, at the point of its flexion, and by bending the finger forwards, we move the organ anteriorly, we become convinced of the great elasticity of the folds of Douglas, which fix the uterus posteriorly. This elasticity makes it also possible for Douglas's *cul-de-sac* to be stretched during defecation without pain. When the uterus offers resistance to pressure of a finger passed into the rectum or vagina, the elasticity of the folds of Douglas are impaired, often unequally shortened or thickened, and they are painful at an attempt to stretch them. If the shortening of these folds is considerable, the uterus with its angle of flexion is placed further backwards and higher in the pelvis, the vaginal portion is markedly in the axis of the vagina, and the os uteri is directed forwards (similar to the position found in case of retroversion, only much higher and farther back in the pelvis). If we succeed by bi-manual palpation in feeling the corpus uteri we will find it lying parallel to the anterior vaginal wall, the point of flexion forming an acute angle with the cervix. The mobility of the body of the uterus towards the cervix may in this case be undisturbed for a long time, as proved by bi-manual examination, when the walls of the abdomen allow of it, but on account of the retroposition of the uterus, the bladder even when externally filled is not able to push back the uterus, its position being one of permanent anteflexion. To recognize this abnormal fixation of the uterus, which causes pathological anteflexion, it is not necessary to examine the folds of Douglas. The high, posterior, eventually also lateral position of the vaginal portion, and its marked direction forwards, but mainly the diminished mobility of the uterus from its vaginal portion, and the pain caused by an attempt to move the same, proves the abnormal fixation backwards, and discriminates this most frequent cause of pathological anteflexion from the normal.

CHAPTER V.

REMNANTS OF INFLAMMATION IN THE NEIGHBORHOOD OF THE UTERUS AND ITS ADNEXA.

THE inflammatory processes of the para- and perimetrium, and of the appendages of the uterus, are so intimately connected with those of the uterus itself, that it is quite impossible to treat of the products of the first without mentioning the latter.

By these inflammatory processes, changes are ordinarily produced in the involved tissues, which never entirely disappear, and can be felt by bi-manual examination after the lapse of years, or demonstrated on the cadavers of women who have been affected during life

Since these pathological changes may exist without giving rise to the slightest pain or sensation, we can not very well call them chronic inflammatory processes, and therefore they are best designated as "remnants" of an antecedent inflammatory process. We will, therefore, treat of these cases, which often form a peculiar form of disease, in a separate chapter.

Since the removal of the diseased, slightly enlarged ovaries, and of the dropsical tubes and broad ligaments, has become an everyday topic of gynecological surgery, this subject is of great importance and we have added a number of original illustrations. The pathological changes caused by these inflammations are often very slight, and only by careful bi-manual palpation or rigid examination of a specimen can we frequently determine the slight alterations. In order to be able to recognize such alterations, it is above all necessary to be familiar with the normal condition of the uterus and its surroundings, both in the living and the dead. Thus we may learn to distinguish the changes which miscarriage, labor, or slight inflammatory process may impress on the pelvic organs.

The Frequency of these "Remnants" and their Influence upon the Pelvic Organs, especially on the Axis and Position of the Uterus.

It is of great importance to recognize the frequency of these remnants, in order to be able to diagnosticate pathological changes of this nature in women who for years have had no complaint from the side of the genital tract.

If we divide the cases as examined *post mortem* into: 1, children before menstruation; 2, menstruating virgins; 3, prostitutes and sterile women; 4, women who have borne children, and compare our observations on the living, we get an insight into the etiology of inflammation of the uterus and its appendages, and we learn that the inflammation of the uterus and its appendages has a somewhat different form in girls and sterile women than in women who have given birth to children, being in the first category usually confined to the neighborhood of the ovaries and tubes.

On the cadavers of thirty children under twelve years, which I examined in Professor Wiederhofer's hospital for children, there was twice inflammation of the cervix, once dilatation of the uterine cavity and dilatation of one tube, and once inflammation of the cervix, adhesions between the left tube and ovary by pseudo-membranes of long standing.

In menstruating virgins remnants of inflammation are rare. My experience with these cases is limited, but still sufficient to show that inflammations in girls with intact hymen is more rare than in the two following classes. In six cases I found once traces of metritis colli, with dilatation of the cavity by mucus, and union between both ovaries and tubes, and their surroundings, by pseudo-membranous adhesions of long standing.

In prostitutes and sterile women residues of inflammation of the uterus and its surroundings are very frequently found. Out of thirty cases in the Rudolph hospital, I found them in ten (33.3 per cent.).

They are found either limited to the uterus, usually to the cervix, or they involve the parametrium and peritoneum. According to the case, the uterus offers various changes during life and on the cadaver. We will first describe the slighter pathological changes around the cervix.

If we compare a normal uterus with one which is surrounded by these inflammatory remnants, the preparation will be found to differ considerably. The cervix cuts with more difficulty, the section is paler near the mucous membrane or throughout. The canal is dilated by hyaline, gray or yellowish mucus containing pus cells, and usually also micrococci. The dilatation may be limited to the lower half or extend throughout the whole cervix. The walls are rather thinned than thickened. The dilatation is more marked in the posterior than the anterior wall. The external os is either normal in width, although firmer or contracted; the internal os is either normal or contracted, but in either case a sound is introduced with difficulty. Often the dilatation does not reach to the internal os, in which case the os internum is simulated at the middle of the cervix. In such cases the body of the uterus is usually normal.

During life these uteri have lost none of their mobility, their cervices are firmer to the touch, and they present more or less the phenomena of anteflexion at a deeper or higher point.

We were obliged to describe this less marked inflammatory variety of the disease since it is often the consequence of other inflammatory affections which leave traces around the tubes and ovaries of unmarried and sterile women.

That the cervix possesses different motions has been proved by irritating the nerves supplying it, and when this mobility is impaired by disease, catarrhal secretions, blood, and semen will not be normally ejected or received, and when infection is introduced by dirty fingers, foreign bodies, or gonorrhœal poison, the organ offers a favorable soil for the development of cocci and bacteria, which may cause inflammation especially during the menstrual period. The extension of the process does not usually take place through the cavity of the uterus, however, since the body of the organ and the proximal ends of the tubes are usually normal, but extension is by means of the lymphatics.

Fig. 22 illustrates a preparation of the uterus of a virgin twenty-four years old, with thickening and dilatation of the lower half of the cervix, and adhesion by a pseudo-membrane (*p*, *r*) between the left ovary and tube. Both are slight but evident residues of a former inflammatory process. The left tube is slightly dilated by mucus, and in the preparation a pseudo-membranous band extends from the same ovary to Douglas's *cul-de-sac*, whereby during life the ovary was somewhat fixed, displaced and made more easily palpable on examination.

A uterus diseased in this way shows during life an angle of flexion directed anteriorly in the middle of the cervix, which can be obliterated by a distended bladder. In a great many cases belonging to this class, residues, besides those described, are found in the parametric tissue, also very frequently in the muscular structure of the folds of Douglas and in the connective tissue and peritoneum surrounding them.

The residues of a parametritis are slighter and more obscure in the cadaver than those of peritonitis, but by comparison with normal organs they can easily be recognized. The peritoneum at its point of attachment to the cervix, at Douglas's *cul-de-sac*, is less movable and is sometimes fixed to the cervix, and the same is thickened posteriorly (see Figs. 23 and 24), and often displaced by cicatricial shortenings of the parametrium and peritoneum. The layers of the broad ligaments near the cervix, and at times to quite a distance, can be separated only with difficulty.

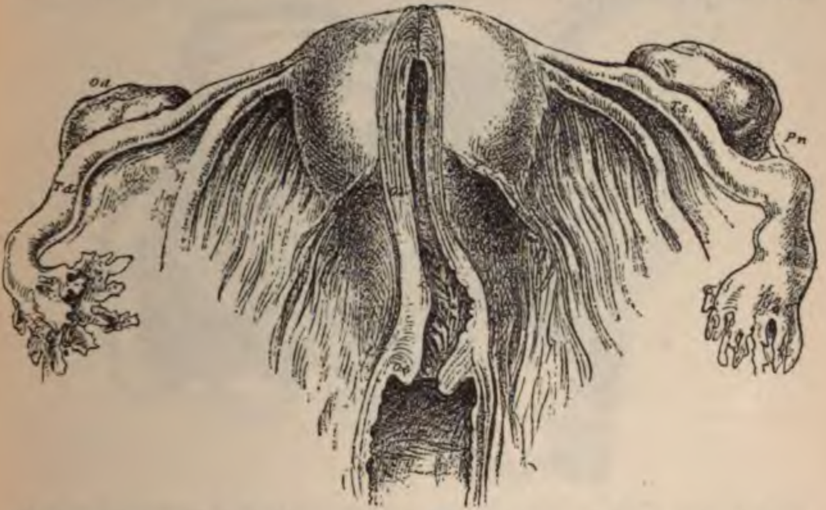


FIG. 22.—This and the following figures illustrate preparations presented by me before the Gynecological section at Freiburg, in 1883, (*vide Archiv. f. Gyn.*, xxii. iii.)

Fig. 23 illustrates the posterior surface and neighborhood of the right half of the uterus of a young nullipara. The whole cervix and the surrounding parametric tissue (*p, c*) in the preparation show the described changes conspicuously. The outer layer of the ovary is thickened, and the organ is displaced by a pseudo-membranous band towards Douglas's *cul-de-sac*, the peritoneum of which (*Pp*) is thickened by the inflammatory process, being shortened and rendered more prominent by the changed cellular tissue surrounding the utero-sacral ligaments; the right tube is distended by catarrhal secretion and shows in its walls phenomena of a former inflammation.

During life the mobility of a uterus diseased in this way is diminished, the cervix is usually displaced posteriorly, often having a horizontal position in the centre or inclining to one side, according to whether the inflammation was symmetrical or to one side. The vaginal portion appears in these cases to be elongated, but this is not really the case, as the examining finger only pushes the vagina higher up on the hardened and more or less fixed cervix, the shortened parametric connective tissue also pulling the vagina higher up on the cervix. The cervix when compared with the body of the uterus seems to be more voluminous, and this is not due to an increase of its muscular or connective tissue, but to the fact that the examining finger feels the adherent parametric tissue together with it.

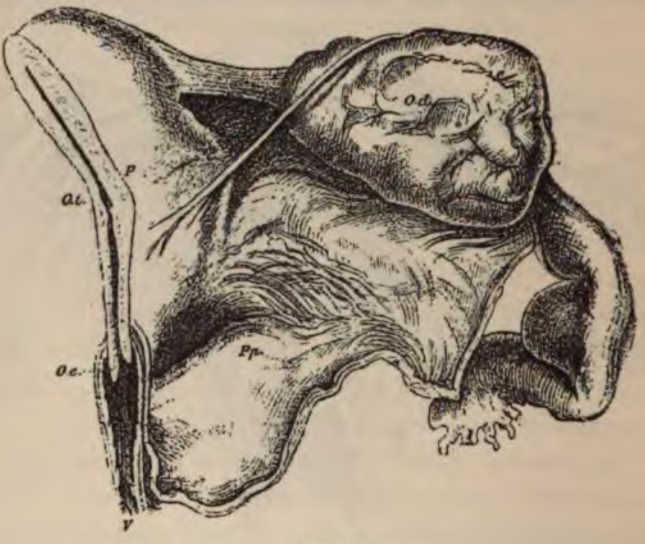


FIG. 23.

According to whether the uterus was originally thinner or thicker, smaller or larger, the inflammatory process produces different forms of anteflexion.

Fixation of the cervix, as the result of these inflammatory changes, leads to recurrent inflammatory processes, the secretion being confined and alterations occurring in it. The less movable cervix is exposed to injury during cohabitation, and we may often detect erosions on the surface of the organ when the tissues are exposed to friction, and thus the chances of infection are increased.

In a number of cases belonging to this class, extensive parametric and also peritoneal residues are found, which usually have their seat around the tubes and ovaries, the latter being connected with each other and with the surroundings of the broad ligaments and the peritoneum of Douglas's *cul-de-sac* by pseudo-membranes.

Fig. 24 represents the uterus of a nullipara. Besides the described changes in the cervix, this preparation showed extensive residues in the parametrium; the blood-vessels and nerves were in many similar cases imbedded in a thickened tissue; the layers of the broad ligaments were firmly adherent to each other and contracted; both ovaries were displaced by strong false membrane towards Douglas's *cul-de-sac*; both tubes somewhat dropsical and fixed to the anterior layer of the broad ligament. The body of the uterus was quite movable and seemingly not diseased.

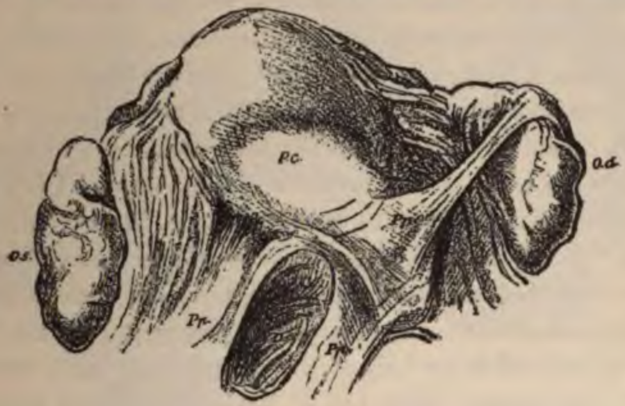


FIG. 24.

These findings are of great importance, for it is not the enlarged uterus, its position and the change of its axis, nor the displaced ovaries, nor the tortuous dilated tubes, which give rise to suffering; but it is the tissue thickenings determinable bi-manually in the surroundings of the uterus which render life a burden to many women.

The mobility of the uterus is more impaired where the para- and perimetric contractions exist to such an extent, than in the former cases, and by the pathological changes in Douglas's *cul-de-sac* the organ is usually displaced posteriorly or postero-laterally, and anteflexed. In cases where inflammation has taken place simultaneously or later in the body of the uterus and its surroundings retro-lateral version or retroflexion may also be found.

On examination the cervix and ovaries are not tender; pain is only felt when by moving the uterus or ovaries traction is made on the parametric tissue.

In a small number of cases belonging to this class residues of parametritis between the uterus and bladder are found. They may often be noticed immediately on making a longitudinal section of the genitals; if the genitals are then lifted up on to the body of the uterus, the bladder will normally separate by its own weight from the cervix for about 1½ inches, being normally connected to it only by loose connective tissue. If parametritis has existed between the uterus and the bladder, then the latter separates only slightly or not at all from the cervix, and if an attempt is made to separate the two organs it is found that they are more intimately connected with one another than normally. In a small number of these cases, one or both ureters are found more or less surrounded by thickened tissue and fixed, to which fact W. A. Freund long ago called attention. Nearly as frequently as between the cervix and bladder remnants are found between the cervix and rectum, and sometimes the body of the uterus is also involved, as is proved *post mortem* by thickening of the tissues, sections of the body of the uterus being made with greater difficulty, the uterine tissues having lost their elasticity although the organ is not much increased in size.

Fig. 25 illustrates the anterior aspect of a uterus of a young nullipara, and shows, besides the described changes, residues between the uterus and bladder. The ureters are imbedded in a thickened tissue, and the body of the uterus also presents evidence of inflammatory changes. The organ was markedly retro-placed in the cadaver. The tubes and ovaries were so much adherent to their surroundings in Douglas's *cul-de-sac* and to the rectum, that they had to be dissected out with the knife and scissors. The body of the uterus formed a right angle with the cervix and could not be straightened by considerable force.

The course of the disease in these frequent cases is, according to observations during life and *post mortem*, as follows: first the cervix is affected by catarrh or gonorrhœal virus, giving rise to inflammation of its wall and surroundings, which terminates in anteflexion. In the altered cervix the secretions stagnate, erosions take place in the canal and around the external os, and from any cause the peritoneum, tubes and ovaries become involved, and at the same time or later the body of the uterus as well.

In women who have borne children the *post-mortem* inflammatory changes are more marked still. I have noticed this fact for years, and in nearly two-thirds of cases in this category inflammatory remnants are found. Winckel has laid stress on the same point. During the past two years, in 130 women, I found in seventy-six marked residues in the parametrium, pelvic peritoneum, ovaries and tubes. In nearly all of these cases the uterus also showed residues of former inflammation, especially the lacerated or cicatrized cervix; the latter were rarely found without the former.

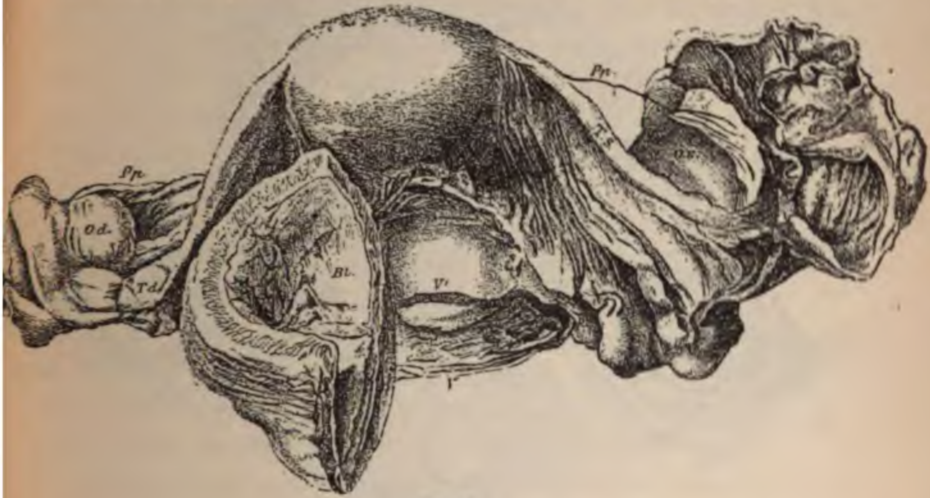


Fig. 25.

Most frequently the residues in this class are found on the cervix and its parametral surroundings; these are nearly as frequent as superficial or deep lacerations of the cervix caused by parturition.

It is very rare that the edges of the lacerations become covered with epithelium and healed without giving rise to inflammation in the wall of the cervix and its surroundings. In such fortunate cases the edges of the lacerated cervix may be gaping so that the index can be introduced, but they remain parallel with the axis of the uterus, and even with lacerations of from ½ to 1 inch no eversion takes place. Such an organ usually presents during life a slight anteflexion, with its angle at the upper edge of the laceration, which is nearly always found firmly adherent to the parametrium, but there is no change in size and consistency.

Still more rare is the occurrence, that lacerations heal *post-partum* as perfectly as if they had been brought together carefully by suture. Out of several hundred cases I found this only twice.

Usually the lacerations of the cervix leave inflammatory remnants in its walls in the parametrium, and peritoneum. We may find the laceration, with edges sharply everted by cicatrices, in the parametrium and in the vagina; the parts between the rents are found in a state of subinvolution or chronic inflammation, or tumefied from venous obstruction caused by the cicatrices.

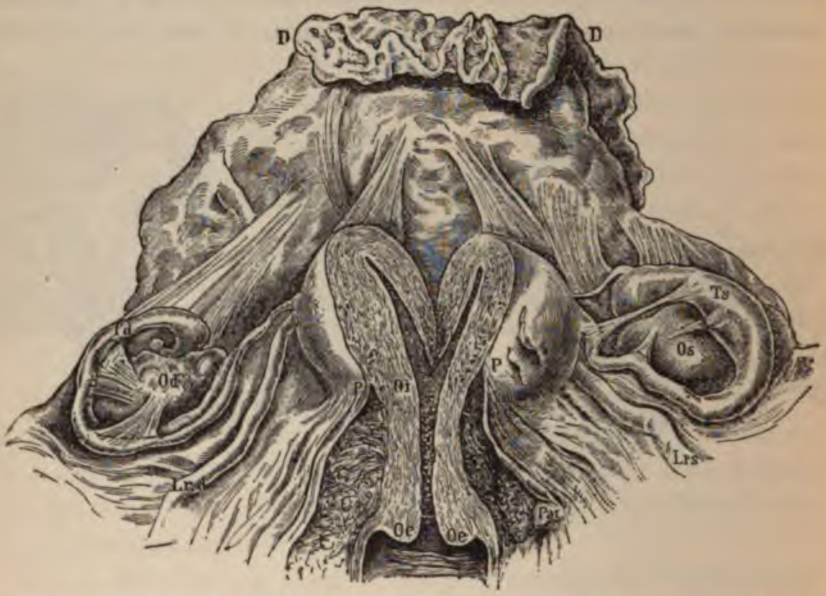


FIG. 26.—PREPARATION FROM A WOMAN 30 YEARS OLD, WHO HAD BEEN DELIVERED A NUMBER OF YEARS PREVIOUSLY. It shows residues around the cervix, in the parametrium and pelvic peritoneum. (Reduced one-half.)

The mucous membrane of the everted cervix, and usually as far upwards as the characteristic membrane of the organ exists, has lost its epithelial covering and is diseased. At the upper portion of the rents, usually corresponding to the upper border of the distinct cervical mucous membrane, there is frequently a cicatricial narrowing (Muller's ring).

In a considerablé number of cases the edges of the laceration are more or less irregularly united by cicatricial tissue, and the external os is often narrowed. The tissue of the cervix is subinvoluted, it is firmer and has lost more or less of its elasticity. The muscular structure of the uterus which radiates into the parametrium is also involved, as is seen to best advantage in the retractores uteri.

The changes in the broad ligaments, the vessels and the nerves, are more marked in this class than in those already described.

During life these uteri have lost more or less of their mobility. The cervix is usually displaced posteriorly or laterally. According to the changes in the tissues surrounding it posteriorly different forms of anteflexion occur; the angle is usually found where the diseased tissue terminates. This formation of anteflexion can be easily observed during the puerperal state.

The cervix feels more or less hard to the touch, and seemingly more voluminous than the body of the uterus, for reasons which we have already laid stress upon A cervix so changed frequently becomes the seat of catarrh, which is the source of recurrent inflammations of the uterus and its surroundings.

In many *post-mortem* cases the uteri are found enlarged without presenting any change in their normal consistency either of the cervix or body; the enlargement is either uniform or more marked in the body or in the cervix, the walls of which are usually thinner and longer.

With this condition of the uterus (subinvolution) large residues, especially in the peritoneum, are frequently found. Here often the uterus is readily replaceable, but again the organ is retroflexed and fixed. In both instances the cervix and its surroundings are generally normal.

In another class of cases similar changes to those which we have described are found in the uterus and in the parametrium surrounding it, the organ frequently thus being bound closely to the adjacent pelvic organs.

In these cases we can observe well the course of the disease as it extends to the retractors uteri. By their firm connection with the surrounding cicatricial tissue and the peritoneum, anteversion or latero version frequently arises when the axis of the uterus has accidentally remained straight during the inflammation. But if the contraction is more anteriorly and laterally, or if peritoneal residues play a *rôle* in the posterior and lateral surroundings of the uterus, retroversion takes place;

torsion of the uterus or a partial projection of its wall may sometimes occur, as is illustrated by Heitzmann. In the formation of anteversion, besides the parametric residues in the posterior surroundings of the cervix, peritoneal and parametric residues between the uterus and bladder often also play a *rôle*.

Residues between the Uterus, its Appendages, the Intestine and Omentum.—These are frequently found in this class, rarely in the former.

These are usually cases in which considerable residues of former inflammation are found in the uterus and its surroundings. In 130 cadavers of which 76 showed residues in the uterus, in the para- and perimetrium, I found this condition 16 times. In a larger number of preparations I found the same percentage. These residues, in the form of plates or bands, are found either immediately between the uterus and a smaller or larger portion of the colon (5 times), small intestine (3 times), or omentum (once), and frequently they extend to the mesentery of the involved intestine, and to the connective tissue on it, or the uterus is bound by pseudo-membranes to the tubes and ovaries, and from these organs radiate pseudo-membranous bands to the ileum, descending colon, or sacrum; the vermiform appendix and the lower border of the mesentery are also sometimes found to be fixed by adhesions coming from the uterine appendages.

Most frequently it happens that the tubes, ovaries and broad ligaments are matted together by pseudo-membranes, which send smaller or larger prolongations, usually to the sigmoid flexure or to a higher point on the colon, or to the small intestines, which become more or less fixed, stretched or twisted. These residues between the uterus, the appendages and the intestines are often connected by smaller or larger pseudo-membranes with the pelvic peritoneum or with that portion of peritoneum lying over the pelvic inlet, under which, usually, subperitoneal tissue thickenings are found, and frequently these residues are also connected with the parametric residues in the immediate or more distant surroundings of the lacerated or cicatrized cervix. In this way a chain of residues exists which begins at the cervix and extends to the broad ligaments, tubes and ovaries, from thence to different points of the intestinal canal, sometimes to the lower border of the omentum and pelvic peritoneum, and also to higher points of the same and to the thickened connective tissue behind it.

Residues between the Cervix, Body of the Uterus and Bladder.—These are more frequently found in the cadavers of women belonging to the last class than in the former. They are usually found in the tissue connecting the cervix with the bladder, and sometimes they extend from the body of the uterus to the peritoneal covering of the bladder, as small or large pseudo-membranous threads, plates or strings. They were found twice in the 76 cases described above.

Simultaneous Disease of the Ovaries and Tubes.—Frequently together with the residues in the uterus and parametrium textural changes are found in the ovaries and tubes, besides the phenomena of perioöphoritis and perisalpingitis which have also been caused by the former inflammation.

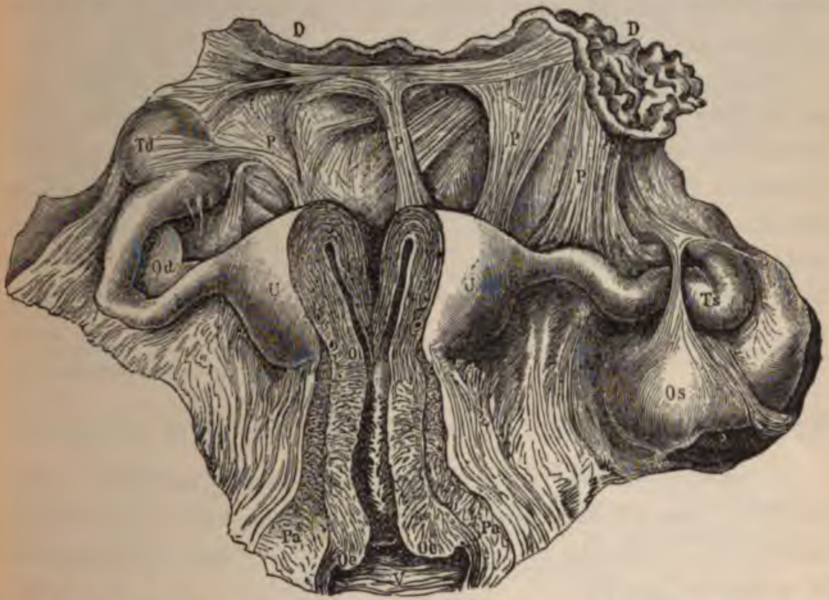


FIG. 27.—PREPARATION FROM A WOMAN 66 YEARS OLD, WHO WAS LAST DELIVERED 25 YEARS BEFORE DEATH. A chain of residues of inflammation is shown, beginning in the cervix, extending through the parametrium, *Pa*, and broad ligaments, to the tubes and ovaries, and from thence to the colon; both ovaries and tubes are diseased. (Reduced one-third.)

They are more frequent in the parous than in nulliparæ.

The ovaries are frequently found enlarged and softened, and often contain small blood cysts. These varieties explain how sometimes excessive hemorrhage from the rupture of a follicle and the formation of hematocele takes place. Often the ovaries are found to be of normal size or smaller, but harder than normal. Often they undergo cystic degeneration and assume a mulberry form as in Fig. 28. The stroma frequently becomes dense, and but little follicular tissue remains. Often only the outer layer becomes very dense.

A frequent finding in these cases is encapsulation of one or both ovaries in pseudo-membranous sacs, so that on the specimen the ovaries cannot be seen (see Fig. 29). These pseudo-membranous sacs are often adherent and matted together with the colon and its surroundings. These pathological conditions of the ovaries and their surroundings render ovariotomy, salpingotomy or removal of all the appendages very difficult or impossible.

Of just as frequent occurrence is disease of the tubes; in nearly half of the cases with residues of inflammation in the para- and perimetrium one or both tubes are found more or less diseased. The practically most important form of this disease is hydrops tubæ, to a greater or less extent, as presented in Figs. 26, 27, 28 and 29. The size most frequently met with is that of the three first figures; rarely do the organs become as large as in Fig. 29, or reach the size of a child's fist, and still more rarely the size of a man's fist.

THE INFLUENCE OF THESE RESIDUES ON THE HEALTH OF THE WOMAN.

Symptoms.—These differ according to the locality and extent of the residues. The uterine symptoms caused by them have been fully described by Fritsch, and will be briefly referred to here only in so far as is necessary.

Endometritis.—Leucorrhœa differing in color, quantity and consistency, is present in nearly every case where inflammatory processes have existed in the uterus. Its course is usually as follows: Endometritis of the cervix or body of the uterus almost always spreads to the entire uterus and its surroundings; the inflammatory process subsides, leaving in the affected tissues the described changes; the mucous membrane of the cervix and body of the uterus remains the seat of a catarrhal process, and by the altered circulation and nutrition, frequently by the narrowed channels of exit from obstruction in the mouths of the glands, and impaired function of the wall, its extension is favored.

Metrorrhagia, too Frequent Menstruation and Irregular Hemorrhages.—These symptoms either follow closely on the inflammatory process, im-

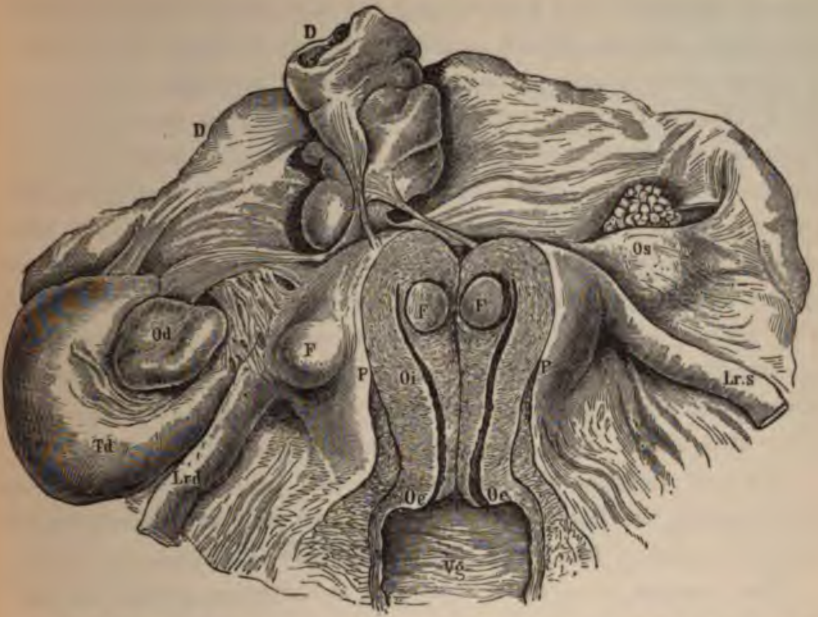


FIG. 28.—PREPARATION FROM A WOMAN 45 YEARS OLD. Metritic, parametric and peritoneal residues. Extensive hydrops tubæ and highly diseased ovaries exist.

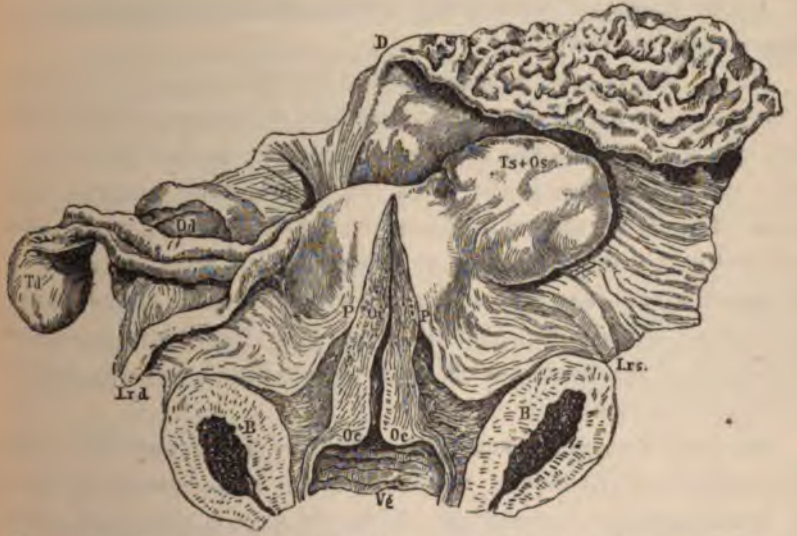


FIG. 29.—PREPARATION FROM A WOMAN 40 YEARS OLD, WHO HAD NOT CONCEIVED FOR SOME TIME. Metritic and parametric residues; diseased ovary and tube on the right, and complete encapsulation of the tube and ovary on the left side. (Reduced one-half.)

prove or disappear for a while or reappear only after a long time, or even after years. Endometritis is usually found only in women who have suffered from inflammation of the uterus and its surroundings. The changes left by these in the blood-vessels and nerves supplying the uterus cause a deficient replacement of the mucous membrane after menstruation, or prevent it entirely, or lead to different thickenings and smaller or larger polypoid growths. Endometritis decidualis also almost exclusively takes place only in uteri that have been inflamed, and the frequent occurrence of abortion in these cases is explained by it. Endometritis in an organ with normal walls and surroundings is extremely rare. Diminished menstruation and amenorrhœa occur in rare cases, where by parametric residues the blood-vessels become gradually compressed, and the uterus either atrophied or in a hyperplastic bloodless condition.

Different varieties of dysmenorrhœa and pain in the intervals of menstruation, the latter especially in women who have given birth to children or aborted frequently, accompany these conditions.

The constant leucorrhœa, continued menorrhagia, produce in these women more or less marked anæmia, which weakens their nervous system and the functional power of all the organs, especially the stomach and intestinal canal. This fact forms an important link in the chain connecting genital diseases of women with nervous affections and diseases of the stomach and intestinal canal.

Pain.—Nearly every woman who has her uterus fixed by residues of inflammation in the parametrium suffers from unpleasant symptoms, since each step or forcible motion calls her attention to the fixed uterus; many feel a constant pressure in the pelvis or a bearing-down sensation in the course of the broad and round ligaments; others feel distinct pain, either localized at a definite point or at different points deep in the pelvis. Bi-manual examination causes pain only when an attempt is made to move the uterus, especially from behind forwards or from above downwards, on account of the traction made on the nerves bound down by cicatrices in the parametrium.

Still more disagreeable and often more painful is this condition when the residues are extensive in the surroundings of the uterus, and when the broad ligaments are cicatrized in different ways, or when both ovaries, normal or diseased, are fixed abnormally to the side of the uterus by peritoneal residues in the broad ligaments, or when they are, together with the diseased tubes, displaced towards Douglas's *cul-de-sac* and more or less fixed there. The more enlarged and more fixed the ovaries the greater is the suffering. The pain is partly due to pressure caused by the enlarged ovaries and partly to constant traction on the parametric residues. During examination pain is usually not felt in the ovaries themselves, except when an attempt is made to move them.

The sensation known as ovaralgia in hysterical women, to which Schützenberger and Charcot called attention, seems also to have its cause in slight, not appreciable, pseudo-membranous connections of the ovaries with their surroundings. Peritoneal residues on the ovaries and tubes alone, forming swellings of the size of an egg or larger, are frequently found after endometritis and metritis colli, in girls and multiparæ, and cause slight or no pain if extensive parametral residues do not coexist. Just as unpleasant and painful is the condition when the uterus has become anteverted, retroverted or retroflexed by para- and perimetric residues, especially when with the latter, as is frequently the case, the tubes and ovaries are more or less matted together, and fixed to a greater or less extent to the walls or floor of Douglas's *cul-de-sac*. In attempting reposition pain is produced by the traction made on the cicatrized tissues. The patients suffering from this condition constantly worry about their complaint, cohabitation causes pain, and finally the act causes disgust.

The psychical condition is decidedly influenced to a greater or less degree by this state, and here again we find an explanation of the connection between genital diseases and nervous and psychical affections.

Recurrent Inflammatory Attacks.—According to our observation these usually originate from a lacerated cervix or from an existing endometritis colli or uteri.

Women having residues of inflammation in their genital organs do not always suffer pain; they may for months or years be exempt, and follow their occupation without complaint. As we have been attending patients in the same place for many years, we know a considerable number of girls and women who have suffered for eight, ten, or twelve years from more or less extensive inflammatory processes in their genital tract. These patients return often only after the lapse of one or two years, complaining of severe leucorrhœa, menorrhagia or localized pain in the pelvis. A new inflammatory process has occurred in a uterus changed by former inflammation. Careful examination of the cervix nearly always reveals either by hyperæmia of its tissues, by greater tension of the same, or by reddening of the cervical mucous membrane, or reddening about the external os, or by markedly red erosions, or by marked reddening of the cervical mucous membrane at its everted portion, or by slight hemorrhage when touched with the sound, or by increased secretion, or by turbidity of the former hyaline secretion, that the cervix has become the starting-point of a new slight inflammation without febrile disturbance, or of a more severe one accompanied by moderate febrile symptoms. These recurrent inflammatory processes of the uterus and its adnexa terminate, under proper treatment, in a short time, the patient enjoying relative good health until by some injurious influence, such as infection, stagnant secretions, dirty fingers or instruments, gonorrhœal poison and prolonged applications, a new inflammatory process is produced. During ten or twelve years we have seen inflammations recur five to ten or even thirty times. These so frequently recurring phenomena are often wrongly ascribed to changes in the axis or in the position of the uterus resulting from former inflammations.

Sometimes a recurring inflammation, an account of the more severe infection, runs a rather unfavorable course; under its influence the contents of the distended tube, which are nearly always present with residues of inflammation in the adnexa, undergo suppuration; the hydrosalpinx, even as a Bartolin cyst, may become an abscess, is changed into a dangerous pyosalpinx which may rupture, evacuate its contents, and cause death; but this is of rare occurrence. These recurring inflammations very frequently appear during menstruation, because the wounded cervical canal and portio vaginalis are more sensitive to infection at this time.

A few authors are of the opinion that the recurrent inflammations are dependent upon difficult ovulation from the diseased ovaries. Others refer them to the diseased tubes, assuming that they contain a noxious secretion which escapes at times and causes the recurrent attacks.

We do not doubt that recurring inflammation may be produced in these two ways; certainly the existence of diseased ovaries and tubes renders a recurring pelvic peritonitic process more severe and dangerous, their contents being changed and increased, and the organs easily rupture, and set up the so-called perforation peritonitis.

Symptoms from the Bladder.—These are present only in a small number of cases. They are frequently referred to changes in the position and axis of the uterus, especially anteversion, but as these changes are often found markedly developed without interfering with the function of the bladder, we must believe that vesical symptoms are produced by inflammatory residues or by inflammatory processes still remaining between the uterus and bladder, or by irritation of and traction on the vesical nerves. The vesical symptoms vary; in one case there is tenesmus, in another difficult micturition; the patient may lose control over the function of the bladder, or different varieties of catarrh may be present. The occurrence of the latter may be explained by incomplete emptying of the bladder, or if the ureters are narrowed by an existing pyelitis, or by frequent examination or catheterization. The vesical symptoms usually appear late in the disease, frequently only at the climacteric period.

Often bending of the ureters by pelvic peritonitic residues, or imbedding of the same in parametric residues, lead to dilatation of the ureters above the bent or compressed portion, causing secondary nephritis and death.

Rectal Symptoms.—The frequent pseudo-membranous adhesions between the uterus, its appendages, and the colon, small intestine and omentum, easily explain the functional disturbances of the intestinal canal often observed in women who have suffered from inflammatory processes in their pelvic organs. Directly and indirectly, partly by traction on the tissues, partly by pressure on the blood-vessels and nerves, the circulation and innervation of the intestinal canal are interfered with, its nutrition and its peristaltic movements are altered. Slight functional disturbances depending upon weakening or hyperæmia of portions of the intestine, frequently give rise to rectal catarrh, constipation, diarrhœa, abnormal accumulation of gases, abnormal movements, etc., in these cases.

More rare are the cases in which these functional disturbances, partly by mechanical interference by these adhesions, partly by the influence of continued chronic inflammation, which lead to paralysis of portions of intestine, result in ileus and cause death.

Effect on the Reproductive Powers.—The changes caused by inflammation of the uterus and its adnexa exert a bad influence upon the power of reproduction. This fact has been well appreciated by authors treating of sterility. Great attention has been paid to this by Grünewald, Mayrhofer, Chrobak, P. Müller, F. Winckel and others, and H. Beigel has written an extensive treatise on this subject ("Pathological Anatomy of Sterility in Females"), in which the consequences of pelvic peritonitic processes are well illustrated.

The frequency of residues of inflammation, which according to our investigations are found in 33.3 per cent. in prostitutes and sterile women, 58.4 per cent. in women who have borne children, explains in most instances absolute or relative sterility in married women

In the first class sterility is usually caused by a catarrhal, cicatrized, and narrowed cervix, which has lost its functional power and has given rise to secondary perioöphoritic and perisalpingitic residues, and also to morbid changes in the tubes and ovaries. In some cases the cause is azoöspermatism in the male. The relation of azoöspermatism in the male to residues of inflammation in sterile women is evident. Azoöspermatism most frequently arises from gonorrhœa and inflammation of both testicles, and although the acute stage had ceased long before marriage, enough virus may remain to infect the wives.

In women who have borne children reproduction becomes usually limited by residues of inflammation in or about the ovaries and tubes. Conception is in the majority of these cases not quite impossible, but only rendered difficult, for even with very extensive residues one or both tubes may be found pervious and the ovaries wholly or partially able to perform their function. Therefore we must be guarded in our prognosis regarding conception after severe inflammation in the pelvis, for cases in which both ovaries become encapsulated in pseudo-membranous sacs or both tubes rendered impervious are rare.

Symptoms from the Nervous System.—The relation of genital diseases in women to nervous affections was long ago recognized. The majority of authors believe the connection to be of frequent occurrence, while others deny it almost entirely; on both sides we find the most prominent representatives of the profession. It is a fact familiar to all physicians that with the most severe forms of disease in the genital tract, as ovarian cysts and sarcoma, uterine myoma and carcinoma, prolapse and inversion of the uterus, vesico-vaginal fistulæ, etc., nervous disturbances are only rarely observed. This fact has been repeatedly emphasized by the opponents of the above-mentioned relation. The fact, however, is not denied by those who believe in the intimate relation, and still in some cases of large fibroma or cystoids a reaction on the nervous system exists:

so-called respiratory neurosis, troublesome cough at times, attacks of asthma, angina pectoris, etc., are frequently observed in connection with these tumors. But more frequently it may be observed that with small ovarian tumors, incarcerated in the pelvis, or by retroflexion of the uterus, annoying, tormenting pain in the pelvis and corresponding lower extremity, or in the upper half of the body, is caused, which disappears when the tumor or uterus are displaced from the pelvis; on the other hand, it frequently occurs that such tumors give rise to no symptoms, indeed it may happen that large tumors, or a retroflexed uterus, fill the whole pelvis and produce no pain or nervous phenomena

These daily observations allow of no other conclusion than that nervous phenomena can only be produced by sexual diseases, when morbid conditions in the nervous system itself exist.

Since the above-mentioned severe forms of disease usually have no appreciable influence upon the nervous system, such an influence can be exerted only by the affections treated of in this chapter. Also according to our own observations, only such women suffer from nervous affections, or rather their nervous affections only become aggravated or assume a different form, who have residues of inflammation in or about their genitals, especially in the parametrium. This can easily be explained if we consider how richly supplied the parametrium is with ganglia and nerves, and how freely they anastomose with each other, and with the peripheral and central nervous system, and if we also remember the rich nervous supply of the pelvic organs themselves. This fact was long ago emphasized by W. A. Freund, and together with H. W. Freund, he investigated the changes on nerves and ganglia imbedded in cicatricial tissue. Klotz has discussed this same point, and A. Hegar, especially in his last treatise, has emphasized it.

Reaction upon a Healthy Nervous System.—The influence exerted by these diseased conditions upon the nervous system varies greatly according to the individuality, temperament, psychological condition, and general health of the patients; especially according as their nervous system is healthy, weakened or diseased, and this explains the fact that a large majority of patients of this class present no nervous phenomena. Most of these women bear their pain and recurring inflammations in the same manner as men suffering from long-continued disease.

Dragging pains in the course of the broad and round ligaments, and neuralgia in nerve trunks and their branches, radiating from the lumbar and sacral plexuses, are frequently observed in women with apparently healthy nervous systems.

Frequently, thus, a parametic residue in the region of the sacral plexus produces all the symptoms of sciatica; that it depends upon genital disease can often be easily proved, for if we mechanically make traction upon such a cicatrix, pain is felt in the region supplied by the ischiatic nerve; or if the residues are situated higher and irritate more the lumbar plexus, and if pressure or traction is made upon the same, pain is felt in the region of the crural or obturator nerves; in both instances flexion and extension of the corresponding extremities can often be produced by mechanical irritation.

It is also observed, but more rarely, that in such cases a neurosis developes in the corresponding foot or upper half of the body.

Reaction upon a Weakened, Diseased Nervous System.—In women who by excessive loss of blood and strength during prolonged disease become anæmic, or in neuropathic individuals, the reaction of inflammatory residues on the nervous system may frequently be observed.

Diseases of the nervous system, aside from the severer forms, are extremely frequent, and so are diseases of the female genitals; therefore the two forms of disease frequently coexist. Genital disease is not the only cause of these severe nervous affections, but it is, as Hegar states, "an essential factor," renders them worse, may also give rise to new symptoms, and there is no doubt that we would perform a great service for these patients if we could eliminate this factor.

Dr. George Beard of America, in his treatise on "Neurasthenia," has called our attention to the frequency of slight diseased conditions of the nervous system, which were formerly partially known to us under the name of nervous weakness, nervousness.

The same subject has latterly been clearly treated of by Rudolph Arndt in a manner more in agreement with our observations. He considers neurasthenia not as Beard, a disease *sui generis*, but simply as a symptom, or collection of symptoms of morbid processes and diseased conditions in the peripheral or central nervous system, the anatomical nature of which we are not always able to ascertain. He asserts that there are no functional disturbances without changes in the organs themselves. Neurasthenia is usually the precursor of severe hopeless affections, not only of the nervous system, but also of other organs. Hypochondriasis, hysteria, epilepsy, catalepsy, chorea, etc., are only peculiar higher grades of neurasthenia. Furthermore Arndt states that the healthy and diseased nerves react, according to the laws of nervous contraction and irritability, discovered by Pflüger, and developed by Bezold, Wundt, Lister, Benedikt and Brenner; healthy nerve function is performed according to the laws of contraction and irritability of healthy nerves; diseased nervous function, according to those of diseased and abnormally nourished, *i.e.*, according to the laws of contraction of fatigued, worn-out nerves. The law of contraction and irritability of nerves discovered by experiments with the galvanic current on frogs, has been confirmed by thermic, chemical and mechanical irritations.

We could not abstain from alluding to the above statements of Arndt, because they may well be applied to the connection between genital and nervous diseases.

Irritation and residues of inflammation in the genitals of women, the nervous system of whom is healthy, do not give rise to marked nervous phenomena; but when present in women where the nervous system is more or less diseased, they cause the most marked, varied and hardly describable morbid phenomena of the nervous system. This accounts for the more marked reaction upon the nervous system, in individuals of the higher classes, who are more prone to neuropathic conditions than the lower classes.

Hysterical women are more affected by simple gynecological examination than women with a healthy nervous system. We know a large number of women in whom simple examination may cause hiccough, vomiting, tonic or clonic spasms, coma, catalepsy, etc., with slight or no changes in their genitals. Careful examination can not reveal any irritation of the genitals, weakening of the central or peripheral inhibitory nervous system; but if we inquire closely into the history of patients suffering from such severe nervous paroxysms, we frequently learn that some member of their family has suffered from severe nervous diseases.

The points from which the irritation is transmitted to the nervous system are numerous: The inner surface of the uterus has lost its epithelial covering, and the nerve ends are bare; the wall of the uterus has become hard and the nerves are pressed upon; the body of the uterus is retroflexed and causes pressure. The parametric tissue, especially around the diseased cervix, has become dense. The broad ligaments are contracted and press upon and pull the nerves. The ovaries are frequently enlarged, diseased and hard, and traction is made on their nerves, or, what we consider of more importance, these organs are adherent by pseudo-membranes to the broad ligament and parametrium, causing pressure and retraction of the nerves.

The course of the nervous irritation varies according to the locality and extent of the residues. They may be limited to the pelvic branches of the intimately connected lumbar and sacral plexuses, or the irritation follows the course of the sympathetic, and may also, through its connection with the vagus or phrenic nerves, travel along their course, or to mention one main track, by the anastomosing branches of the sympathetic ganglia with the lumbar nerve travel along the spinal cord, and even to th brain. The irritation transmitted to a nervous centre by the peripheral nerves in and around the genitals, affects also other organs connected with the same centre. In this way the so-called reflex neuroses, in parts remote from the sexual organs, are produced.

Reflex Neuroses.—The most frequent and demonstrable forms of inflammatory residues, reflecting upon the nervous system, are those limited to the pelvis and its immediate neighborhood. The most frequent complaints in these cases are: constant pressure, burning and painful sensation in the sacrum; a sensation of burning, either symmetrical or only on one side, situated deep in the pelvis or in the epidermis in the lower part of the abdomen, or on the external genitals. Further, motor and sensory disturbances in a lower extremity are often observed corresponding to the seat of a residue, and the same may hold true of the upper half of the body

Distinct reflex neuroses are in almost every case observed only when local symptoms are present in the pelvis and its neighborhood. The connection between this kind of neurosis with genital disease, its dependence upon the same, after careful examination, can not be denied in neurasthenic individuals. It is proved by many phenomena; the nervous attacks may be preceded by an aura arising from the genitals; or may be caused by mechanical pressure, or traction made upon parametric cicatrices, or upon peritoneal, or ovarian residues connected with them; or the symptoms may be caused to disappear by reposition of a retroflexed uterus. Such cases are frequently observed; for instance, I was able to demonstrate several cases in one week, in which nervous attacks could be produced by pressure made on perimetric residues.

There are also cases in which a connection between the two affections exists, but can not be proved with certainty; for instance, there is no doubt that the nervous phenomena in neurasthenic women are aggravated or otherwise modified by endometritis of the cervix or corpus uteri, by erosions, etc., but this connection can only be suspected and not made certain before the symptoms of endometritis disappear, together with the nervous phenomena.

Sympathetic Neuroses.—The connection between genital disease and neurosis can most frequently be observed in organs richly supplied by sympathetic nerves; among these are to be mentioned in the first place the stomach and intestines.

The connection between the uterus and the stomach, as evidenced by "morning sickness" during pregnancy, has also been experimentally demonstrated. C. F. Kretschy observed, in a patient with fistula of the stomach, that during menstruation acid formation in the stomach went on uninterruptedly, while during the inter-menstrual period, the acid was only formed at regular intervals, with periods of alkalinity. It is not known whether or not she suffered from genital disease. Specialists in diseases of the digestive organs, as for instance latterly Oser, emphasize the frequent occurrence of neuroses of the stomach and intestines simultaneously with diseases of the genitals, and admit that the two are often connected. Any motor, sensory or secretory neurosis may occur, but the most frequently observed are, eructations, nausea, vomiting, globus, cardialgia, enteralgia, dyspepsia and anorexia. To explain the frequent coexistence of diseases in the digestive organs and genitals, we must not always refer to irritation of the peripheral nerves in the pelvis, for atonic conditions in the digestive tract frequently are present in weak and anæmic women, and after delivery the uterus of such women is frequently subinvoluted or retroflexed, and the impaired function of the stomach and intestines coexists with diseased genitals. During menstruation such women usually lose a large quantity of blood, the condition of the stomach grows worse, excitation of the nerves by the retroflexed or enlarged uterus may be assumed as the cause, and yet anæmia be at the bottom of the whole trouble.

Cerebral and Spinal Neuroses.—Next in frequency are neuroses in organs richly supplied by the vagus. Partly dependent upon genital disease are the so-called respiratory and cardiac neuroses. Further, although it is difficult to prove their connection, since they often exist without sexual disease, are the following: cephalalgia, clavus, hemicrania and trigeminal neuralgia.

Very common, and sometimes dependent upon genital disease, is spinal irritation, a general or localized tenderness of the spinal column, with more or less hyperesthesia; it seems to lead rather to neuralgia of the cervical and intercostal, the lumbar and sacral nerves, and is especially frequently observed as mastodynia and coccyodynia.

In the majority of women suffering from sexual diseases, who have been under our treatment for years, the reflex neuroses in the stomach and intestinal canal are the only ones which remain probably dependent on psychical alterations of varying form and severity.

Functional disturbances in the organs of special sense are also frequently observed in women, and are said to depend upon sexual irritation. Förster has described a morbid condition, which begins with pain in the eye-ball and its neighborhood, and is accompanied by photophobia, which he terms "kopiopia hysterica." A. Mooren has also laid stress on the connection between visual disturbances and uterine disease, and Weber Liel the influence of the latter upon affections of hearing. We have observed such phenomena too infrequently to be able to express decided views, but it is likely that disease of the genitals may have a reflex influence on the organs of special sense.

Vaso-motor Disturbances.—We frequently observe, especially in nervous women, sudden flushes of the face and neck, continuing for a long time or limited to one side of the face. Blood extravasations into the skin and mucous membranes are frequent in women, and probably many a hemoptosis, hematemesis, etc., and many menorrhagias, are only of vaso-motor origin. To this class belong also the obscure hemicrania, migraine, etc., the cause of which was believed by Du Bois Raymond, 1860, to be narrowing of the arteries of the corresponding side of the head, while Möllendorf, eight years later, stated that it was due to paralysis of the muscular layer of the blood-vessels, and dilatation of the arteries of the brain. Under this heading belongs also swelling of the thyroid gland during pregnancy, and the fact that this gland becomes more frequently swollen in women than in men. We must also mention in this connection the various phenomena of the skin which are more frequently observed in women than in men: chloasma uterinum, the yellow or yellowish brown pigmentation of the skin, which is observed in nearly one third of pregnant women; and which is more rarely seen and is less intense in non-pregnant women; acne rosacea also occurs more frequently in women. With all these skin affections, however, we very often cannot discover any disease of the genitals, but they are frequently accompanied by menstrual irregularities, such as occasional amenorrhœa, scanty menstruation, prolonged menstruation, which may however be caused only by nervous influences.

Psychic Disturbances of a mild character are frequently observed in women with genital disease, but this is not always the only cause, although it can not be denied that prolonged inflammatory diseases in the pelvic organs, and their results, may to a greater or less degree, affect the mind. The patients become depressed, dissatisfied, melancholic or hypochondriac, very irritable; they cry often from slight cause; many can not rid themselves of the thought that they have a cancer, consider themselves doomed, express weariness of life, and sometimes threaten to commit suicide.

Such psychic disturbances occur usually in connection with reflex neuroses of the stomach and intestinal canal, and are the only ones which may be observed for many years. That these psychic changes should develop into real mental disease, or into "hysteria" with severe nervous attacks, is a supposition not sustained by our observations. Out of the many women we have treated for years, not one has committed the threatened suicide, become markedly hysterical, or the inmate of an insane asylum.

If the inmates of an insane asylum are examined gynecologically we must necessarily find the same percentage of inflammatory residues in their genitals as is in the generality of women. The coexistence of insanity and genital disease is accidental, but probably the latter aggravates the former, and therefore should be considered in the treatment.

Treatment.—The tissue changes caused by inflammation, the parametric and peritoneal cicatrices, and the pseudo-membranous adhesions between the pelvic organs, can not be removed by any medical treatment. Surgical interference is also not in every case successful, for even if we remove the ovaries, tubes and parts of the broad ligaments, those parametric cicatrices which exert the most pressure on the nerves and give rise to the grave symptoms, may be left in the deeper parts of the pelvis. Still we do not question but that with the removal of a dropsical or pus-containing tube and diseased ovaries a constant danger is disposed of.

Cure of Endometritis.—Since these diseases usually originate in the uterus, and the tissue changes are gradually developed by frequently recurring inflammations, we must pay great attention to the inflammatory processes in the genital tract when they appear for the first time, and to the epithelial losses left by them. Curing the diseased mucous membranes of the genital tract is the best prophylactic against parametric processes and their frequent recurrence.

Hot Vaginal Irrigations (90° to 93° F.) —When these are administered to the patient on her back the water distends the vagina and causes contraction of the genital tract and of the muscular structures. If used for a long time hey often have a good result.

Massage, as a means for stretching the accessible cicatricial bands, has often a good result upon the local symptoms as well as upon the radiating pains and sometimes also upon the reflex neuroses. We may mention the favorable influence of stretching cicatrices in the treatment of vesico-vaginal fistulæ. By stretching the upper edge of the parametrically fixed fistula the pain gradually disappears. A disadvantage of this treatment is its uncertainty, for very frequently nerves are bound down by cicatrices in such localities where it is impossible to stretch them This procedure may also become dangerous when swellings of the tubes are present by causing their rupture or infection from them. Bi-manual stretching, using only a pair of forceps or tenaculum to fix the uterus, is to be preferred to all other methods, for in this way we can best exert direct traction upon the cicatrices. We will illustrate our method with the report of two cases: A woman aged thirty-two years had suffered for twelve years from an old exudation in the parametrium which fixed the cervix to the left, binding the left ovary to the broad ligament. First I steadied the cervix by introducing a finger into the vagina and with the aid of the external hand pulled it in a direction opposite to the cicatrix; later I steadied the uterus with a tenaculum and stretched the tense cicatricial tissue. I continued this procedure every third or fourth day for six weeks; the pain disappeared a year ago and has not yet returned. In another case of six years' standing I used in addition to stretching the cicatrices, hot vaginal irrigations, and without applying any instrument I succeeded in stretching the cicatrices and in the course of twelve weeks the pain gradually disappeared. Since this time the patient has given birth to one child.

W. A. Freund made the attempt to exert constant traction upon parametric cicatrices by fixing the portio vaginalis with a lever pessary and passing a wire through one lip. C. Chrobak applied elastic traction and invented an apparatus for it.

W. A. Freund has also pulled out very painful parametric bands through an opening made in the fornix vaginæ and cut them, without attaining appreciable results.

Laparotomy for the Removal of the Uterine Appendages.—Although this treatment is still under discussion we will mention it because we think that in extreme cases, when tubes and ovaries are considerably diseased, the operation is justified, and because in a large number of cases it has been performed.

We think we are correct in assuming that salpingotomy and the removal of the uterine adnexa has gradually developed from castration introduced by A. Hegar and Battey. Salpingotomy was performed by Hegar October 19, 1877, at which time he expressed the opinion that a division between castration and salpingotomy must necessarily be made. In the early reports upon this matter we frequently read that many operators intending to perform castration found the tubes or all the uterine appendages diseased and removed them as well. Cases of castration without satisfactory results are reported where the operators were sorry that they had not removed the tubes at the time of the operation. Under the heading of "Castration" we also find cases in which only one ovary, which was found diseased, or the uterine appendages on one side were removed, and the healthy ovary left. This makes it evident that the operations were not performed to bring on artificially the climacteric period, but for the removal of the diseased and changed organs. For this reason, and especially because it was believed that diseased dropsical tubes are often the cause of chronic and recurrent diseases in women, many specialists, Lawson Tait, Gusserow, Sänger, Hegar, Tauffer and others, extirpated diseased tubes and also all the uterine appendages, with good results in many cases. H. Klotz combined extirpation of the uterine appendages with the stretching of parametric and peritoneal adhesions until the uterus became movable, as he states with good results.

CHAPTER VI.

HEMORRHAGES INTO THE PERITONEAL CAVITY AND PELVIC CONNECTIVE TISSUE.

HEMORRHAGES which originate from the vessels of the female pelvis may be divided into such as give rise to tumors in the peritoneal and sub-peritoneal cavities, sub-cutaneous pelvic cavity, and in the external genitals, and into such as rapidly cause death. We will treat of the first, which are more frequent, under the names "hematocele," "hematocele ante-uterina," "hematoma" or "thrombus vulvæ," "hematoma or thrombus vaginæ," "hematoma peri-uterinum or ligamenti lati," or "thrombus ligamenti lati" and "hematoma alæ vespertilionis," and the latter, which are usually the termination of extra-uterine pregnancy, already discussed in its proper place, we will briefly mention as hemorrhages rapidly causing death.

HEMORRHAGES INTO THE PERITONEAL CAVITY.

Hematocele Retro-Uterina.—Voisin, to whom we owe the most complete monograph on this subject, believes this affection to have been known to Hippocrates and also to Galenus. From his history of this disease we learn that Pelletan reported a case of intra-peritoneal hemorrhage in 1810 under the heading "hemorrhage in consequence of ovarian aneurism." Récamier also observed several cases of retro-uterine hemorrhage. Two of these cases have been reported by H Bourdon, 1841, under the heading "blood cysts of the pelvic cavity" and "blood tumor entirely filling the true pelvis." In these two cases and in another, which was not recognized as a blood tumor, Récamier made an incision through the posterior fornix of the vagina and evacuated large quantities of blood. At the same time Ollivier d'Angers and Dr. Bernutz reported several cases of intra-peritoneal hemorrhage. These reports make it evident that the occurrence of blood tumors was a fact known long before Nélaton more exactly described them; but this does not diminish his merit, for it is to his reports and those of his students, that we owe our exact knowledge which enables us to make a positive and quick diagnosis in these cases.

Nélaton, in 1850, named the disease in question hematocele retro-uterina, meaning by this encapsulated blood extravasation in the peritoneal cavity of the true pelvis occurring usually during menstruation. The name hematocele peri-uterina was chosen by several other authors, and we do not approve of it because it implies the idea of a tumor equally surrounding the uterus on all sides, which is not the case, for as we learn from thirty-five out of thirty-six cases collected by Voisin and according to our own observations, the tumor is usually so situated as to dislocate the uterus anteriorly and upwards, and to be palpable through the vagina at its anterior and to a considerable extent at its lateral periphery.

Since hematocele retro-uterina has been recognized it was largely discussed whether the blood tumor is intra- or extra-peritoneal. Nélaton held from the beginning that the swelling was intra-peritoneal, and this by the researches of Virchow has recently been confirmed. C. Schröder proved that up to the time of his report only one case of extra-peritoneal blood extravasation occurred in the absence of child-birth. It was in a twenty-eight year old shop-girl who died of typhus fever.

But even at the present time several authors, as Hewitt, Thomas, Gallard, Olshausen, Scanzoni and others, express their opinion that extra-peritoneal blood extravasations may, though rarely, take place. Besides the fact that it is anatomically possible and that blood extravasations into the broad ligaments, the pelvic connective tissue, ischio-rectal fossa and in the neighborhood of the labia majora, after delivery and in rare cases also before delivery, frequently take place, this opinion has been supported by a treatise published by Jacob Kuhn of Frankenhäuser's clinic in 1874. In two cases extra-peritoneal blood extravasation was diagnosed during life and confirmed by necropsy.

However, extra-peritoneal blood extravasations not dependent upon delivery and childbed seem to be of more frequent occurrence than was formerly believed, for a considerable number of such cases have been reported by A. Martin, Olshausen, P. Zweifel, Konrad, Düvelius, Baumgärtner, and others. A. Martin, W. Schlesinger and W. A. Freund have treated extensively of this form of blood extravasations.

Pathological Anatomy.—Hematocele in women rarely causes death, and therefore we owe our knowledge of this disease mostly to clinical observations. There are certainly cases in which women have died from hematocele, but only late in the disease, when the source of the bleeding could not be determined and when the extravasated blood and its peritoneal covering had undergone changes, and the pseudo-membranes encapsulating the blood clot and matting together the convolutions of the intestine had assumed such an appearance that it was impossible to ascertain the time of their occurrence and duration. We, therefore, cannot obtain from the dissecting table such a clear picture of hematocele retro-uterina as from our observations on the living, in the beginning of the affection.

Nélaton's description of the affection has been confirmed by Voisin, who in seven necropsies found his diagnosis, made during life, correct, and by C. Schröder who found the same in eight necropsies. We have no personal experience in this direction, as none of our cases have died, and therefore we will give the pathology of this disease according to Voisin and Schröder.

In all cases there was more or less extensive peritonitis of long standing as shown by the numerous pseudo-membranes and strong adhesions between the abdominal organs. The peritonitis evidently started in the pelvis. In place of Douglas's *cul-de-sac* a large cavity, from the size of a fist to a child's head, was found; one case has been reported in which an enormous sac surrounded by pseudo-membranes was found between the uterus and rectum extending towards the abdominal walls, and partially towards the iliac fossa. In some cases two or three smaller sacs communicated with one another and formed the blood cavity.

The lateral walls of the cavity and its floor were formed by peritoneum, the anterior, posterior and upper walls by the uterus, broad ligaments and sigmoid flexure, connected more or less intimately by pseudomembranous adhesions. In large cavities the roof was sometimes formed by convolutions of intestine matted together with neighboring structures. In rare cases pseudo-membranous bands extended over the uterus and bladder to the anterior abdominal wall.

The inner surface of the cavities was rarely smooth, but usually had a shaggy appearance caused by fibrinous deposits. Trabeculæ in the cavity were frequently formed by pseudo-membranous bands and plates.

The contents of the cavities consisted of more or less changed blood.

Sometimes blood was found varying in amount to ten ounces, residues of blood of tar consistency and appearance, blood coagula mixed with pus. Breslau and Rindfleisch found in the blood of hematocele many serrated and shrunken blood corpuscles and only a few normal ones, numerous cells resembling white corpuscles or pus cells, and single epithelioid granular cells. Heurteaux found also hematin and hematoidine crystals, oil drops and crystals of ammonia magnesium phosphate (Voisin).

The uterus was nearly always so displaced by the hematocele that its vaginal portion pointed upwards towards the symphysis pubis. Sometimes the body of the uterus was displaced to one side, usually to the left and anteriorly, and in a few cases it was retroverted by pseudo-membranous masses. In size and appearance the organ was usually normal. Elongation and increase in size, found in some cases, seem to have had no connection with this affection. The uterine appendages present more or less marked changes, most frequent in the ovaries. In many cases the latter are so changed that they may readily be considered the source of the hemorrhage. In fifteen necropsies one or the other ovary presented marked morbid changes, in six cases blood, small blood cysts or clots, and in a few small pus centres. Still in many instances the ovaries are normal.

The Fallopian tubes are nearly as frequently changed as the ovaries, and besides various adhesions of the same with the neighboring organs they are sometimes rendered impervious or dilated with blood or pus. The broad ligaments also often show, besides thickening and adhesion to the retro-uterine sac, blood clots between their layers, and Müller describes a case in which a blood clot as large as a pigeon's egg was found in the right broad ligament and near it a tear three lines in length; in a case, also, reported by Silvestre, a bloody tumor was found in the right broad ligament communicating with a retro-uterine blood cavity. Ferber frequently found in the pelvic peritoneum ecchymotic spots, and in rare cases bands and areas of congested capillaries, and sometimes recent residues of slight hemorrhages into the pelvic peritoneum which evidently gave rise to no symptoms during life and had terminated in resolution. Similar findings were also reported by Olshausen and others, and we have seen fibrinous deposits on the pelvic peritoneum which evidently resulted from blood extravasations.

Furnished with these pathologico-anatomical results, we will give an account of the various opinions about the source of the hemorrhage, and the etiology of the affection in question.

The Source of the Hemorrhage.—Nélaton considered hematocle retro-uterina as an accident of menstruation, and thought that the hemorrhage was caused by spontaneous escape of the ovum. Laugier agrees with Nélaton, only he thinks that hemorrhage into Douglas's *cul-de-sac* takes place when the spontaneous escape occurs under conditions which abnormally increase the congestion of menstruation.

By lifting heavy weights, dancing, coitus during menstruation, one or more ovarian follicles may remain gaping and be the source of hemorrhage, in which the vessels of the follicular wall, corpus luteum and ovarian tissue participate.

The changes in the ovary were called by Laugier apoplexy, later increased congestion. Scanzoni also speaks of apoplexy and ovarian hematoma as the cause of hematocele retro-uterina, and refers to a case of a girl eighteen years of age, who suddenly died during menstruation with symptoms of internal hemorrhage. *Post-mortem* revealed on the right ovary a sac as large as an egg filled with coagulated blood, the posterior wall of which showed a rent about an inch in length through which a large quantity of blood had escaped into the abdominal cavity. Puech reports similar cases. Smaller or larger blood-clots or small cysts are frequently found in the ovaries; their occurrence is usually preceded by swelling and softening of the surrounding parenchyma, and we therefore can easily understand that if to an ovary changed in this way abnormal menstrual congestion is added, the rupture of a Graafian follicle may be followed by considerable hemorrhage into Douglas's *cul-de-sac.*

In many post-mortems the ovaries were found normal and the tubes the seat of the described changes; the question arises, What was the cause of the hemorrhage from the tubes? Virgués advanced the theory that hematocele is caused by tubal pregnancy, the rupture of the young ovum causing the hemorrhage. Gallard brought this theory to the notice of the profession. Schröder and Veit accepted this idea. Indeed this opinion seems to be correct, since we find, during life and on the cadaver, many phenomena common to hematocele and extra-uterine pregnancy. So we find both usually in multiparæ; both usually arise long after the last pregnancy, and we sometimes find with hematocele amenorrhœa of one or two months. In the cadaver we often find both narrowing or plugging of a tube. Out of eight cases of Schröder's this was found in three, while in two other cases dilatation of a tube is reported. This is also supported by a statement made by Ferber He says: Frequently menstruation ceases without causing any complaint, the patients believing themselves pregnant. Suddenly profuse uterine hemorrhage takes place accompanied by symptoms of peritonitis, and the patient believes she has aborted, while a tumor rapidly developes in the neighborhood of the uterus. Although we do not agree with Gallard that every hematocele is the result of extra-uterine pregnancy, still we believe that some are. The objection made to this opinion, that in no case of hematocele diagnosed during life, was a decidua found in the uterus or a fœtus or parts of an ovum exterior to it, does not prove anything, for we know how rapidly absorption of the young fœtus may occur, and the thin decidua could have been easily carried off by the hemorrhage; and again, in many cases of abortion at the first three months we can not find trace of a fœtus.

Since the occurrence of extra-uterine pregnancy is a fact, and as it must be admitted by everybody that the delicate coverings of the ovum as well as the delicate decidua may be lost between the pseudo-membranous adhesions, this opinion is certainly justified. It also frequently occurs that in the course of late extra-uterine pregnancy the covering of the ovum, or a blood-vessel near its attachment ruptures. In this way hematocele may develop with extra-uterine pregnancy Considerable hemorrhage from the tubes may also take place under other conditions. As proved by Lee, Pouchet, Raciborsky, and others, the tubes are also a source of the menstrual flow, and so it is possible that, when the proximal opening of one or the other tube is obstructed, with abnormal menstrual congestion a larger amount of blood should escape into the abdominal cavity and form hematocele. The process may exist for several menstrual periods, and after adhesions have formed hematosalpinx may be developed, which may rupture at the succeeding menstrual epoch, and ancient blood may flow from the tube and recent blood from the borders of the rent into Douglas's fossa, and cause an hematocele.

The reports of autopsies done upon these cases render it probable that the blood forming the hematocele may in some instances come from the vessels which are in the broad ligament. Richet and Dëvalz were of that opinion, and considered the hemorrhage to be due to a varicocele of the ovary; and Scanzoni defends varicosities of the sub-peritoneal veins, as the source of the hemorrhage in rare cases. But only in very few instances of this kind have conditions of the uterus and labia been seen which would lead us to conclude that varicose veins were present. Undoubtedly a venous trunk of the broad ligament may occasionally rupture under the pressure consequent upon menstrual congestion, or in consequence of pathological changes in its walls; and so a hemorrhagic focus be formed, which sooner or later breaks through the walls of the broad ligament, and pouring into the retro-uterine excavation, forms a hematocele. Post mortems show that the fatal hemorrhage occurs in this way in tubal pregnancies. Olivier d'Angers describes a case of tubal pregnancy at about the third month, in which rupture of a vein in the broad ligament ensued. In the midst of the right broad ligament was a plexus of vessels filled with black coagulated blood, the individual veins of which were as thick as a crow-quill. One of these veins showed a circumscribed rupture, from which the fatal hemorrhage had occurred. At the same time he mentions two other cases in which women died in the course of a few hours from an intra-peritoneal hemorrhage, without any extra-uterine ovum being found. One belonged to Leclerc, and the woman died in three hours, from the hemorrhage coming from an ulcerated varicose vessel in the thickness of the left broad ligament. The other woman was twenty-five years old, and had two children; she collapsed suddenly, and died in half an hour. At the autopsy it was found that the right venous plexus ovaria was varicose, and had ruptured. Schröder also had a case of hematocele (Observations VIII.), in which the right broad ligament contained a pigeon's-egg-sized coagulum, and near which was a rupture in a vessel three lines in length, from which the blood had probably poured into the recto-uterine excavation.

Undoubtedly the women do not always die of such a hemorrhage; and these cases justify us in regarding the vessels of the broad ligament as a possible source of the bleeding.

The French authorities (Huguier, Dolbeau, Tardieu), claim that the peritoneal coat of the uterus is the source of the blood, which passes by transudation. But Virchow undertook to show from *post-mortem* records that hematocele might be due to a peritonitis hemorrhagica. He says: "Besides, it frequently occurs that inflammatory processes arise in the pelvic cavity, and cause a pathological vascularization, and local hyperæmias and hemorrhages, which, repeated from time to time, may give rise to considerable accumulations. In these latter cases it may happen that peritonitis retro-uterina, like a pachymeningitis, may give rise to false membranes; and the extravasation which ensues from the vessels of these pseudo-membranes is confined between its layers, and so gives rise to a closed (encysted) hematoma retro-uterinum." Clinical experience teaches us that this is really the course of things in many pelvic tumors situated behind the uterus. It agrees also with Ferber's views, who claims that we must regard a large number of hematoceles as pelveo-peritonitic processes (pelvi-peritonitis) due to blood extravasations. Thus in most cases of hematocele a puncture will give us tarry blood; but some cases, apparently entirely similar, give us a more or less bloody serous fluid. These latter are only to be explained upon Virchow's theory.

It was formerly believed that there could occur a reflux of blood from the uterus along the tubes into the peritoneal cavity, and so hematocele be formed. (Hélie.) This view was supported by the fact that in women who died of the acute exanthemata while menstruating, the uterus was found filled with a coagulum, the processes of which stretched into the tubes; and also by the fact that in certain cases of hematometra and hematokolpos, hematosalpinx was also present. Trousseau maintained that in marked uterine flexion the blood might regurgitate and form hematocele. But we hold that but few hematoceles arise in this way, and that in most cases the blood comes not from the uterus but from the interior of the tubes.

Spencer Wells has called attention to a peculiar source of hemorrhage in these cases. It is not uncommon after ovariotomies to have the tubes enclosed in the pedicle which is attached to the abdominal wall, and for months after the operation a little blood may be observed to well out from the tubal mouths at each menstruation. If now the ligated or cauterized pedicle has been left in the abdomen, it would cause trouble every month, and symptoms of hematocele might occur. Kroner has published a similar case from Spiegelberg's clinic.

Cause of the Hemorrhage.—We have already seen that the causes of a pelvic hemorrhage, have usually been present for a long time before it actually occurs. One or other ovary, tube or broad ligament, or the peritoneum or the uterus, has undergone a pathological change, which predisposes its vessels to rupture, and so gives rise to hemorrhage. The age and occupations of the women most subject to hematocele favor this view. Hematocele retro-uterina most frequently occurs, according to Voisin's collected cases, between the twenty-fifth and thirty-sixth years Among thirty-four cases in which the age is given, one only was under twenty-one, and one only over forty years of age. Twenty were between twenty-five and thirty-six years old, four between twenty-one and twenty-five, and four between thirty-five and forty years. Among the forty-five patients whom Schröder refers to in his above-mentioned article, the age is mentioned of forty-three. It was:

22 to 25 years,	in 3 cases.
25 " 30 "	" 14 "
30 " 35 "	" 13 "
35 " 40 "	" 9 "
40 " 43 "	" 3 "
53 "	" 1 case.

These statistics agree with our own observations, and prove that women are most liable to retro-uterine hematocele during their most fruitful period, from the twenty-fifth to the thirty-fifth year. The cause of the affection is usually to be found in some abnormal condition of the organs of generation. Most of these women had had one or more children; of Voisin's, thirty cases, and of Schröder's, forty-one had had them. This is of importance, since it renders it possible that the adnexa of the uterus were diseased, and were not only the cause of the sterility, which had in most cases been present for several years, but also the *remote cause* of the hematocele. And the history of these cases also tends to prove that the women were not in perfect health when they suffered from the pelvic hemorrhage; many cases suffered from irregular menstruation and pain for a long time before the hemorrhage set in.

The adnexa once diseased, any cause which increases the blood-pressure in the pelvic vessels may cause rupture and a more or less extensive hemorrhage. We shall therefore find the immediate cause of retro-uterine hematocele specially active at the time of the regular menstrual congestion of the pelvic organs. In most of Voisin's cases the rupture occurred during and especially toward the end of menstruation

Almost always these changes of the adnexa are conjoined with inflammatory processes, though these latter may not be very pronounced. If the pathological change is far advanced—if, for instance, a follicle has developed in a large, loose-tissued, and vascular ovary—the vascular congestion at the time in question may be alone sufficient to cause it to rupture, and a considerable hemorrhage may occur from its blood-vessel walls. The same thing may occur from increased vascular pressure at other times. The conditions are the same as in apoplexy; the changes in the cerebral vessels have been long present when a hearty meal or mental excitement determines a rupture. But as in the brain sound vessels may occasionally rupture, so may healthy adnexa sometimes give rise to hematocele. The injuries which cause the accident either with healthy or diseased organs are the proximate causes of the affection.

The most frequent of these causes is intercourse during menstruation. Often women suffering from hematocele will tell us of their own accord that sexual congress had been indulged in during or immediately after the menstrual epoch. In ten cases that Voisin observed, this was stated to be the case in seven; and the first attack of pain usually occurred during the sexual act itself. Excessive intercourse itself may cause a hemorrhage. Puech mentions a prostitute twenty-five years old, who caused the formation of a hematocele in herself by the excessive practice of her profession, and died of it; and Scanzoni and others have observed the affection in public women.

But other causes may also increase menstrual congestion. Patients will often tell us that they danced the whole night through while flowing, or that they did much scrubbing or other heavy work

Next to sexual intercourse the most important immediate cause of the affection seems to be sudden cooling, especially of the lower extremities, and long-continued sitting. If a menstruating woman stands for a long time in cold water, the amount of blood in the extremities will be diminished, and the amount in the pelvis increased; and this will also occur if the sitting position is maintained for too long a time. That these causes are really efficacious is vouched for by the fact that so large a proportion of these cases occur in working women. Thus Weber of St. Petersburg observed twenty-three cases of retro-uterine hematocele in women belonging to the hard-working classes. Sempstresses, according to Voisin, are very subject to it. Women of the richer classes are more carefully tended during the puerperal period, and therefore less frequently suffer from the remote causes of hematocele; they are less exposed to the immediate causes, and if their organs are diseased, they are more likely to reach the climacterium without the formation of hematocele

Anomalies of the blood and of the vascular wall, may also be the cause of hemorrhage into the peritoneal cavity. There are a number of cases of women who have died of the acute exanthemata, in whom considerable quantities of blood were found in the *cul-de-sac*. Ferber mentions purpura, icterus gravidarum, scarlatina, variola and measles, and Scanzoni adds typhus, as being among these conditions. Trousseau long ago differentiated hemorrhages due to these blood conditions from those due to other causes, calling them "cachectic hematoceles." We have seen develop in a strong woman thirty years old, who was suffering from morbus maculosus Werlhofii, first a hemorrhage in the vitreous humor of the right eye, and six weeks later, at a menstrual epoch, a fist-sized hematocele.

Flexions of the uterus are mentioned by Trousseau and others as occasional causes of hematocele.

As regards the frequency of the malady there is the greatest difference of opinion. Hugenberger says that he only saw hematocele twice in 3801 cases, and v. Scanzoni in his practice of twenty-eight years only saw eight undoubted cases. On the other hand Seyfert (Prague) found the affection 66 times in 1272 cases (5 per cent.); and Olshausen in two years saw it 34 times in 1145 patients, and in two other years 29 times in 769 sick persons (4 per cent.) Löhlein believes that there hardly occur 4 cases of hematocele among 1000 women affected with disease of the sexual organs. We have been able to certainly demonstrate four pronounced cases of hematocele among 5000 women examined at the polyclinic in the last five years, but this excludes a good many cases in which it was probably present.

Mode of Origin of Retro-uterine Hematocele.—Opinions differ upon this subject. Until lately the view was generally held that hematocele was formed in the way that Nélaton had described. Nélaton claimed that the effused blood collected in the retro-uterine excavation, as the deepest part of the pelvis, and that an inflammatory process was set up in the surrounding walls of the pelvis and the neighboring organs, which soon led to encapsulation of the mass. Thus a tumor was formed limited in front by the broad ligaments, behind by the rectum and the peritoneum, below by the utero-rectal *cul-de-sac*, and above by the coils of agglutinated intestine.

Thus, according to Nélaton, the hemorrhage is the primary occurrence, and the peritonitis, pseudo-membranous adhesion of the organs and encapsulation only secondary phenomena.

Schröder, on the other hand, holds that a tumor palpable from the vagina, can only be formed from blood accumulation after Douglas's *cul-de-sac* has been closed from above by a partial adhesive peritonitis. There will always be a history of pain and menstrual disturbance to correspond to this preliminary peritonitis. Thus a hemorrhage into this lower closed portion of the peritoneal cavity, will give us a more or less large and tense tumor. In a later monograph (1873) Schröder admits that the blood tumor may arise in either one of these two ways.

It is worthy of mention here that Fritsch attempted to obtain experimental evidence as to the mode of formation of hematocele. He attempted to find out whether coagula exercised an irritant influence upon the peritoneum, and in what way. He therefore injected non-defibrinated rabbit's blood into the peritoneal cavity of a rabbit. Even after three to six hours only a small portion of the blood was left, and no inflammatory processes were set up. Nevertheless Fritsch believes that the human peritoneum is much more vulnerable than that of the lower animals; and he holds that in most cases of hematocele the hemorrhage is the primary and the inflammation the secondary process.

Course.—Most cases, when left to themselves, end in cure. The most common result is absorption of the tumor; more rarely the tumor breaks through into the rectum, vagina, or peritoneal cavity; and sometimes it ends in suppuration.

Absorption of the Tumors.—In almost every case which we have had an opportunity to observe, the affection began with considerable violence; within a few days after the first appearance of the symptoms a tumor the size of a fist or a child's head could be felt in the posterior vaginal vault. The severe pain and the subsequent fever usually kept the patient in bed. Only in exceptional cases was the tumor formed slowly and of small size, the patient being able to be up during the formation and absorption of the hematocele. In a few cases they were able even to do all their usual work, while a fairly large hematocele was being collected. If left to itself, the tumor gradually loses its fluctuating feeling, and in a few days becomes quite hard. Voisin's dictum: "The tumor from the moment of its formation shows a tendency to diminish in size," is correct-

The fluid portions of the effused blood are absorbed, and the inflammatory effusions upon the pelvic walls become harder and dryer. Voisin says that he has observed that the process of diminution in size takes place by fits and starts, being especially apt to be marked at the menstrual epoch. The hardening does not take place evenly throughout the mass. Through the posterior vaginal vault we may observe that some places long preserve their fluctuation, as Olshausen has noticed, while others rapidly become harder. Small hemorrhages have usually condensed in eight to ten days into harder tumors; larger ones remain soft and fluctuating, and give a tarry blood on puncture two and three months after their occurrence, as we have seen them. In some cases the tumor increases in size instead of diminishing, renewed hemorrhages or inflammatory processes, or both, occurring at the menstrual epochs. As the tumor diminishes the pain decreases, the fever lessens, the vesical and rectal symptoms disappear, and the patients often feel so well in a week or two that they want to leave their beds. But a long period of time must usually elapse before resorption is complete. In twenty-four cases drawn from the clinical records of Professor C. v. Braun, 12 cures by absorption took place, taking two to six months time. Absorption occurred in 15 out of 25 of Voisin's cases which were let alone; the time occupied in the process is given in seven cases—

twice	it took	1¼	months.
3 times	"	4	"
once	"	6	"
"	"	8	"

Rupture of the Blood-tumor into the Rectum, the Vagina or the General Peritoneal Cavity.—Resorption does not always occur as we have described; there may set in circumscribed or diffuse inflammations of the walls of the sac, leading to ulceration and rupture into some other part. The contents of the sac may be but little changed, and the inspissated blood is gradually poured out. But sometimes there occurs, previously to this, suppuration of the entire contents of the sac; the thickened blood becomes transformed into pus, and causes, even before rupture, the usual symptoms of pus retention.

Rupture occurs most frequently into the rectum.

This I found was the course of the disease twice in the records of Professor C. v. Braun's clinic, occurring in one case after the tumor had existed four weeks, and in the other after it had been present three months. In both a thickened, but otherwise little altered blood passed for several days per rectum. In both cases an opening three inches above the rectum could be distinctly felt with the index finger. The first patient was cured in six weeks, while the second one took three months longer before she got well. Voisin observed this mode of termination six times in twenty-seven cases.

Now since five out of these six cases recovered, we cannot regard the occurrence as one fraught with much danger. Nevertheless it is worthy of our attention, since suppuration might take place in the emptied cavity, and the life of the patient be imperilled. Voisin relates that in one case symptoms of putrid infection showed themselves a short time after the mass had been evacuated per rectum, and the patient died having chills and high fever. Voisin mentions also a second fatal case, after rectal perforation from Guerard's division.

Rupture into the vagina is rarer; we have never seen it occur, nor does it appear in the clinical records. Voisin states that it happened three times in twenty-seven cases. The result was favorable in every case, probably because the facilities for drainage were excellent whatever position the patient assumed.

Rare also is the termination by rupture of the capsule and evacuation into the abdominal cavity. We know nothing about it ourselves. According to Voisin it occurred four times in his twenty-seven cases; and in every case the decomposed purulent blood caused a fatal peritonitis.

Symptoms and Diagnosis.—The symptoms will vary as the hemorrhage is slow or rapid, and the amount of blood poured into the recto-uterine excavation is large or small.

In most cases there is irregularity of menstruation and pain at the period for several months before the affection begins. These irregularities may consist in a superabundant flow or amenorrhœa for several months. Sometimes there is pain alone either at the menses, or between times. But in many cases, according to Voisin in twenty-five per cent., the affection begins without any prodromata, and we have ourselves observed some cases in which the women said that they had never been sick before. As a rule the trouble begins at a menstrual epoch, with more or less pain in the lower abdominal region. The first attack of pain is often accompanied with a sense of fear and agitation, nausea, vomiting, chills, etc. A fairly constant symptom is the discoloration of the skin, pointing to an internal hemorrhage; and, according to the amount of blood lost, is there a greater or less feeling of thirst. Usually the menses, if flowing, cease when the pains come on, to reappear after a few days as a moderate, long-continued outflow.

The pains are mostly confined to the pelvis and its neighborhood. Usually they are so violent as to compel the patient to go to bed; sometimes they are bad enough to cause collapse; but occasionally the woman does not lie down at all. They are distinctly rhythmical in their character, and may cease for a time, to reappear with renewed violence. Sometimes they are colicky. Usually there is a feeling of weight or heaviness in the pelvis, and, as when the child's head is at the outlet, the women feel as if they wanted to make water or to go to stool. This feeling may be so marked as to amount to rectal and vesical tenesmus, and often lasts for some time after the tumor is found.

After the first attacks of pain there ensue febrile symptoms due to the pelvic-peritonitis which accompanies the formation of the hematocele. The temperature may go up to 101° or 102°, and the pulse to 100 or 120. The abdomen, especially in its lower parts, is slightly swollen.

The sudden pain during menstruation and the subsequent peritoneal symptoms are important points in the diagnosis of hematocele.

We will probably not be able to feel the tumor that is forming or has just been formed through the external abdominal walls; these latter are tense and very tender, and palpation is hardly possible. After a few days the first violent symptoms will have passed away, and there is left a dull feeling of pain and pressure in the lower abdomen. In many cases there occur exacerbations from recrudescent partial peritonitis or renewed hemorrhages. These are most liable to occur at the menstrual epoch, and they may last for months, though getting less and less violent.

When the first fever and pain and abdominal tension have passed off, we will discover at the pelvic entrance, lying behind the displaced uterus, a tumor, the borders of which can usually not be distinctly mapped out. In most of our cases the tumor did not project more than two to four finger-breadths over the level of the pelvic entrance; and it so surrounded the body of the uterus that its outlines could not be made out, though its superior hardness enabled us to recognize it. As a rule the tumor lay rather to one or the other side. In Voisin's twenty-four observations the tumor lay sixteen times more to the right, and eight times more to the left; while in the cases which Schröder collected the tumor was situated in by far the larger number of the cases, more to the left. As a rule the tumor had attained its greatest size in the first few days; but in some cases it continued to grow for over a month. In fifteen of Voisin's cases, the tumor was:

6 times 4 finger-breadths below the navel.
6 " 3 " " " " "
2 " 1 " " " " "
1 time 5 " " " " "

and in one case even two finger-breadths above the navel. Occasionally these tumors extend into one or the other iliac fossa. Scanzoni also has seen the mass extend to the navel in two cases.

The higher the tumor extends the easier will it be to map out its boundaries by percussion. In most of the recorded cases there was a dull percussion note over the visible or palpable tumor. The tumor itself is soft and doughy, and its upper boundaries, at first, at least, difficult to make out. The older it is the more distinctly can its walls be felt, for the pseudo-membranous capsule grows always thicker, and the tumor becomes harder as resorption of the blood serum goes on. Furrows appear as the tumor becomes older; and one part may be harder than another, or even a hard portion may subsequently become soft.

The affection causes quite characteristic vaginal appearances. As a rule we can feel it and make out its lower boundaries per vaginam immediately after its occurrence, and before the tension and tenderness of the abdominal walls will permit us to make an external examination.

The tumor, varying from the size of an apple to that of a man's head, depresses Douglas's pouch; and only the vaginal wall apparently separates it from the examining finger. The uterus is usually displaced forwards and somewhat upwards, so that the cervix is at the level of the symphysis and is pressed against it. Often the cervix is hard to reach, though we have never seen it quite unattainable.

If circumstances permit a bimanual examination so early, we will find that the tumor is behind the uterus and rests against it. Its lower periphery is usually within two inches of the introitus vagina; Voisin found 1.2, 1.4, 2.4, 2.8 inches distant in four cases. This will depend of course not only upon the magnitude of the hemorrhage, but also upon the varying depth of Douglas's *cul-de-sac* in different persons

The feeling of the tumor in the vagina, at first soft, soon becomes hard and tense, and gives one in fresh cases the impression of a rubber ball filled with water. This feeling may remain for weeks. The tumor we found to be always immovable, though Voisin claims that it was mobile in seven of his cases.

The tumor, at first perceptible from the vagina, then recognizable by careful bi-manual examination through the abdominal walls; the connection with menstruation; the sudden and violent beginning; these are the most important points in the diagnosis.

There is but little probability that a tumor appearing under such circumstances will contain anything but blood. This, however, we cannot decide without a puncture of the most prominent portion of the tumor per vaginam.

We have ourselves done this with an exploring trocar without doing any damage; but the practitioner should be informed that the proceeding is not always devoid of danger, especially without disinfection of the instrument. Oulemont did it once; a chill followed, and for five weeks the life of the woman was in danger

Since the tumor fills a large part of the pelvis and the inflammatory processes render the parts very sensitive, a specular examination is not to be recommended, nor can we get from it any more information than the finger alone will give us. Nonat and Voisin claim that there is a violet discoloration of the fundus vaginæ; a statement which, perhaps because we have used the instrument so seldom in these cases, we can neither agree with nor deny. Rectal examination will tell us no more than vaginal. The lumen of the rectum is of course encroached on. An examination with the sound, to find out the exact relations of the uterus to the tumor may be undertaken; but it will teach the practised examiner nothing that he has not already ascertained by bi-manual examination.

When the blood tumor has hardened, the pressure exercised by it causes the rectal and vesical symptoms to come into prominence. The urine is burning and painful, and is voided ten to twenty times in the twenty-four hours. Sometimes, when the tumor presses upon the vesical neck, there is retention, and the catheter must be used. But while this symptom may be wanting, constipation with swollen abdomen and painful defæcation are constant symptoms. The symptoms showing pressure upon nerves and vessels are of rare occurrence; though there are often pains in the lower extremities along the course of the crural and sciatic nerves, and anæsthesia of the skin. Sometimes there occurs later in the course of the malady œdema of one or the other extremity.

These pressure symptoms are often accompanied by the signs of hyperæmia and inflammation of the neighboring organs. There is often a moderate discharge of blood from the uterus; in fact it was absent in but few of our cases. A bloody mucus may be voided from the rectum, and bloody urine is often noticed.

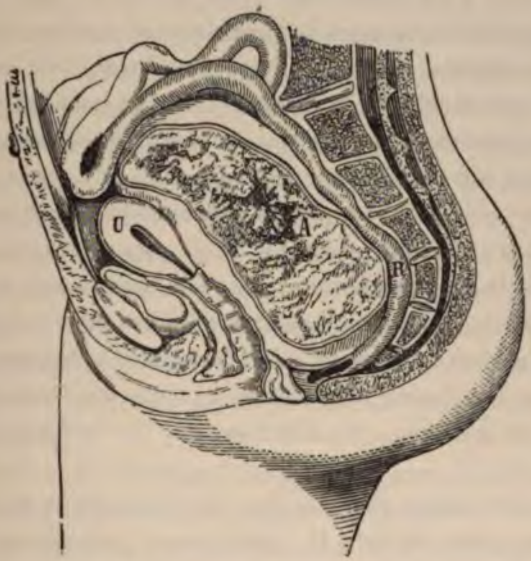


FIG. 30—HEMATOCELE RETRO UTERINA IN CONSEQUENCE OF OVARIAN DISEASE. (*Barnes*). *U*, the uterus, displaced anteriorly; *A*, the hematocele, above *R*, bounded by plastic lymph and coils of intestine.

The longer the blood tumor persists, the more do its characteristic appearances diminish; since its fluid portions continually diminish and its capsule becomes thicker and stronger. When the tumor in Douglas's pouch has once lost its elasticity, it may easily be confounded with other conditions.

The differential diagnosis lies between extra-uterine pregnancy, especially when this has been in existence for several months without giving rise to any special symptoms, and suddenly makes its presence known. If slight menstruation has persisted, if the breasts are not markedly changed, if the extra-uterine sac lies in Douglas's pouch, and if a sudden hemorrhage from some portion of the ovum has given rise to the symptoms, a diagnostic mistake can easily be made. Physicians who have had much experience in these affections have made them.

Under the above circumstances the diagnosis can hardly be made at all, and we must watch the case before we can come to any conclusion.

Under certain circumstances we may just as easily confound with hematocele:

Partial peritonitis, situated in the pelvis and its immediate neighborhood. If an attack of this nature has pursued a chronic course for some time, and if with much pain it suddenly forms a tumor behind the uterus, the vaginal appearances may be exactly like those of hematocele. The tumors in these cases occur from the collection in a space in the recto-uterine cavum, closed in by pseudo-membranous adhesions, of serous, bloody, or purulent fluid. As a rule these processes occur, however, in connection with the puerperium; they are not so apt to occur at a menstrual period; no anæmic appearance follows their advent; all these things speak against hematocele. But these cases sometimes resemble the disease we are considering very closely, and the most experienced gynecologist may be mistaken. So also there may be confounded with hematocele:

Ovarian cysts, while they are still not too large to sink behind the uterus in the pelvic cavity. If inflammatory processes set in and they become adherent, and if a sudden increase of inflammation with pain occurs, they may seem very like a fresh hematocele to vaginal touch. The same is true of cysts of the broad ligaments and neighboring parts. Long-continued observation is needed before a diagnosis can be made; if the tumor remains unaltered in consistency and size, it is probably a cyst.

Less likely to lead to a mistake in diagnosis are:

Myomata of the Collum Uteri.—If a fibroid is developed at the point of junction of the vagina and uterus, and if it is very soft or contains a cystic space, it may resemble a hematocele. We have several times seen tumors situated at the posterior side of the uterine neck, in which the womb was dislocated upwards and forwards, exactly as in the cases that we are considering. But even if inflammatory symptoms set in, we ought with care to be able to appreciate the connection between the uterus and the tumor, and to recognize that the cervical lip is continuous with the myomatous tumor, and that a large part of the vagina is intimately connected with it.

Lateral Hæmatometra with Duplexity of the Uterus.—The rudimentary closed cornu or vagina is gradually dilated by the accumulating menstrual blood until it forms a tumor in the pelvic canal, which may very much resemble a hematocele. The normal uterus is often displaced so greatly laterally, and so twisted upon its axis, that the tumor is often found in front of the womb. A number of these cases have been described as hematocele ante-uterina. Simon has done much to clear up the diagnosis of the affection. Schröder refers these cases to their real cause, proving that in all the instances described as hematocele ante-uterina, the relations and seat of the tumor and the nature of the pain were quite different from that of hematocele. The youth of the women, the gradual increase of the pain with each successive menstruation, the deep and lateral seat of the tumor, are not in accordance with the symptoms of hematocele, and point to a lateral hæmatometra and hæmatokolpos, and to duplexity of the utero-vaginal tube. Hematocele rarely if ever occurs in young girls who have never had children. Sometimes also the uterine body on the occluded side will be found intact, placed like an appendix upon the blood-distended cervix and vagina.

Retro-flexion of the Pregnant Uterus at the time (third month) when it commences to cause pressure symptoms in the pelvis. The position of the body of the uterus and its relation to the cervix and vagina, are similar to those of hematocele; and a superficial examination with one hand only might lead to error. But the retro-flexed pregnant uterus can always be recognized on careful bi-manual examination

It has occurred that harm has been done by attempts to replace a hematocele, under the supposition that it was the retro-flexed uterus; and a retro-flexed pregnant uterus has been punctured from the vagina under the same mistaken diagnosis.

Treatment.—Shortly after the affection was recognized in France by Nélaton, many attempts were made to cure the affection quickly by puncture or incision through the posterior vaginal wall, and evacuation of the contents of the tumor.

But even before Nélaton described the disease, Récamier, whose rule it was to puncture all pelvic tumors, twice pierced tumors through the posterior vaginal vault which were undoubtedly hematoceles. Récamier used a pharyngotome, and made a longitudinal incision. Then he passed one or two fingers into the wound, cleared out the blood-clots, put on a tight abdominal bandage, and washed the cavity out three times a day with warm water.

Nélaton himself adopted a somewhat different mode of procedure. He punctured with a medium-sized trocar, evacuated the blood, injected the sac with warm water under gentle pressure, and a few days later threw in a warm iodine solution. Nonat did the same, but in addition put in a drainage tube.

But a few fatal cases soon led Nélaton to revoke the dictum, "every hematocele is to be treated surgically;" and surgeons soon stopped operating upon it. This is especially the case since the appearance of Voisin's comprehensive monograph, which contains statistics of the twenty cases treated surgically, of which five, or twenty-five per cent. died, while several of those that recovered had been in imminent peril. When we read that a woman treated by Malgaigne and Nélaton died from the wounding of a retro-uterine artery, that one of Hugier's patients succumbed to peritonitis twelve hours after the injection of 3½ ounces of water into the sac, we do not wonder at the hesitation manifested by practitioners to interfere.

All modern authorities agree that with recent hematocele we must carefully avoid all operative interference; and only proceed to it when suppuration, or rupture into neighboring organs or the peritoneal cavity, or long-continued and severe pain, had set in. Thus the treatment resolves itself in an expectant, symptomatic, and a surgical treatment.

The expectant symptomatic treatment consists first in an attempt to control the hemorrhage; the less blood is lost, the sooner will the woman get well. The patient should remain quietly in bed; an ice-bag is to be laid over a wet cloth which is folded six to eight times and spread upon the abdomen, and cold vaginal, or, better, rectal injections are to be employed. This latter appears to us to be especially useful. Rectal irrigation by means of a double catheter and an irrigator will be the best.

The blood tumor once formed we must endeavor to prevent renewed hemorrhage, and, while combating the peritonitis and the anæmia, endeavor to procure the absorption of the tumor which is there.

For these purposes the patient must stay some weeks in bed, and the cold applications must be continued for a long time. Since the danger of hemorrhage and renewed inflammatory reaction is admittedly greatest at the menstrual epoch, treatment should certainly be persisted in over that period. It has been recommended to elevate the pelvis, so as to favor the reflux of the blood. The flexed lower extremities should rest upon cushions, and the abdomen should be protected by a cradle from the pressure of the bed-clothes; and inunctions of equal parts of chloroform and oil with or without morphine will relieve the pain. Attention must be paid to the regular evacuation of rectum and bladder. The French surgeons especially recommend local depletion over the lower abdomen and at the anus, often using sixty to eighty leeches. We consider this quite superflous. Weakness and anæmia should be combatted by a light nutritious diet and wine. Lukewarm sitz and general baths have a favorable influence upon the process of resorption; but they are not to be employed until the abdominal pain and fever have ceased. A bath used too early not infrequently excites renewed inflammation and causes more pain. We have never seen any great influence exercised upon the resorptive process by the customary inunction with iodine, iodide of potassium, ungt. cinereum, or the use of suppositories containing these drugs.

Since it takes months, as a general thing, before the blood-tumor entirely disappears, the patient should be very careful of herself, especially when menstruating, sexual intercourse being of course forbidden.

Most modern authorities agree in a general way with Nélaton in this conception of the course to be pursued, though Zweifel advocates more energetic proceedings, and Martin has eight times done laparotomy for extra-peritoneal blood effusion. Schröder, who appears to have tried opening and evacuation of hematocele several times, says that he is convinced that the course of the affection is not at all shortened by incision and drainage. According to our own experience surgical treatment of the blood-tumors is only proper under the following two conditions:

1. When a large blood-tumor remains unchanged for weeks, and shows no signs of absorption.

2. When symptoms of suppuration appear.

In the first case we are confronted with the probability that sooner or later the mass will break into other cavities, or undergo a purulent change. The evacuation of the tumor will relieve the patient from the teasing pain, and the danger of suppuration will be averted. This latter is no slight danger; for if once chills and high fever show that the contents of the mass are undergoing suppuration, we do not know whether the woman will get well, even after evacuation. But the time for evacuation is to be postponed as much as possible, lest a new hemorrhage occur into the empty cavity. When a blood-tumor has been present several weeks, and when a menstrual period has been passed, this danger is probably only slight. It is a fact that especially many cases which are treated operatively shortly after the hemorrhage has occurred, end unfortunately.

In the second case evacuation is urgently demanded, and is not to be postponed; the more the injurious matters are taken up into the blood the greater are the dangers to the woman.

As to the mode of evacuation, some surgeons puncture and empty the cavity gradually, while others make a free incision and clean the sac out as thoroughly as possible. Or again, an aspirator like those of Dieulafoy or Leiter may be employed; they are so constructed that air cannot possibly enter the cavity.

The method to be employed will depend upon the case. Any one done antiseptically will ease the patient, hasten a cure, and avert threatening symptoms.

Puncture.—This seems in many cases to be just as efficacious as incision. If it reveals the presence of pus, it should be immediately followed by a free opening. It is most conveniently to be done with a medium-sized curved or straight trocar, through the most prominent portion of the posterior vaginal vault, under the guidance of the finger in the vagina. As much of the thickened blood as the tension of the walls of the sac and abdomen expel is permitted to flow out. It is better to rest satisfied with this, since the equable pressure of the walls of the sac and abdomen prevent air from entering the cavity. We have seen several cases treated in this way, and have ourselves several times taken away three to six ounces of inspissated blood without any ill consequences. Sometimes the contents of the sac are so thick, or the pressure in it so small, that the contents only flow out drop by drop; in these cases the canula may safely be allowed to remain *in situ* for several hours, when a considerable quantity will have been passed. Iodoform-gauze is to be laid over the puncture or the opening of the canula. The patients usually feel lighter after the evacuation, and the tumor soon begins t smaller. Latterly C. v. Braun seems inclined to favor more active measures, and advises in his book that if but little blood exudes through the puncture, it is to be enlarged in a sagittal direction with Greenhalgh's metrotome, the cavity cleared out, and antiseptic irrigation instituted. In twenty-two years there have been observed thirty hematoceles, some as large as a man's head, in his clinic; cure followed puncture in fifteen cases, and was spontaneous in fifteen cases. It was but seldom necessary to enlarge the puncture.

There is danger in attempting to squeeze out the entire contents of the sac after puncture; adhesions may be torn apart, and the walls being elastic and fixed, will, when the pressure is remitted, aspirate air into the cavity, giving rise possibly to a peritonitis or to decomposition of the contents of the sac and a fatal septicæmia.

Incision.—If large-sized blood-tumors remain unchanged for a long time, and give rise to much pain; or if febrile symptoms appear, a free opening of the mass is proper, so as to permit of complete outflow. With full antiseptic precautions, incision is probably not as dangerous as it once was. The vagina must first be disinfected, and the relation of the tumor to the neighboring parts be ascertained, so as not to unnecessarily destroy tissue, or perhaps endanger the rectum. Not infrequently we will find at the lower portion of the tumor, somewhere in the posterior vaginal vault, a soft and thin spot at which opening can best be done. If the vaginal arteries are wounded, there may be serious hemorrhage; and it is advisable to search for their pulsation at the preliminary examination, and to locate them exactly. The incision can be best made when the parts have been exposed by a Sims speculum; an ordinary sharp and probe-pointed bistoury are all the instruments that are necessary. The cut is preferably made in a sagittal direction, since thus the vaginal arteries are most likely to be avoided. If the contents of the sac are foul, they must be carefully emptied out, the cavity cleansed with some disinfecting solution (2 per cent. carbolic acid sol.), and a drainage tube put in.

In five cases, of which four were successful, Zweifel opened blood-tumors situated behind the uterus in two stages, so as to avoid hemorrhage. After introducing a speculum he first cut through the vaginal wall; and when the bleeding had stopped, he tore the edges apart with a pair of Muzeaux's scissors, and with his finger denuded the wall of the tumor. Then he incised the mass, and dilated the incision with Simpson's covered metrotome No. 2, to the breadth of three fingers. With the help of a self-retaining drainage tube he kept the cavity nearly constantly irrigated. In the first cases he washed the wound out every two to three hours with carbolic acid solution; in the later cases he added iodoform, which he highly recommends. In spite of the use of Mundé's blunt curette, the evacuation of blood clots is not always completely successful. In his last edition Zweifel criticises the method, as well as A. Martin's plan "to introduce laparotomy for blood-tumors." We will consider it when we come to the subject of hematoma peri-uterinum

HEMATOCELE ANTE-UTERINA.

Under this name we understand a blood-tumor which has formed in the vesico-uterine excavation. This by no means occurs under such constant relationship as does retro-uterine hematocele, and does not form nearly so typical a picture of disease. It is, as Schröder says, most often a part of other diseases; and it has been so rarely observed that the history of the recorded cases may perhaps give us some idea of its mode of origin.

In the first cases which came to *post-mortem* examination it was in connection with large retro-uterine hematocele (Martin, Magron and Soulié), and the tumor formed of the blood which flowed over the uterus did not form a projection which was perceptible externally.

In a second case, by G. Braun, the woman was thirty-five years old, and had had two children, the last nine years ago. Pains set in, and a tumor six inches long appeared in front of the uterus, displacing the bladder to the right, and filling the anterior vaginal vault. An exploratory puncture was made in the anterior vaginal vault, and the bloody contents of the tumor were evacuated with a Dieulafoy aspirator. Four days later the woman died. The autopsy showed the existence of peritonitis; at the place of the tumor was a sac as large as a child's head, the walls of which posteriorly and below were the broad ligament and the uterus, and to the left the sigmoid flexure, anteriorly and above adherent coils of small intestine the great omentum, and the bladder.

In a further case, related by C. Schröder, the ante-uterine blood-tumor was an occurrence in a tubal pregnancy, and had happened from a rent of the sac. The woman was thirty-three years old, had had one child three years before; the autopsy revealed a large intra-peritoneal ante-uterine mass of blood, which extended to the region of the external os uteri. During life it formed a plainly distinguishable ante-uterine tumor, composed of non-encapsulated, simply coagulated blood. The uterus was attached to the rectum by numerous broad fibrinous bands, so that there was no recto-uterine excavation. Schröder considered the posterior displacement of the uterus not as due to the formation of the ante-uterine hematocele, but as the condition necessary for the formation of the latter, forming a space analogous to Douglas's *cul-de-sac*, in front of the uterus. It is probable, in Schröder's opinion, that when the posterior *cul-de-sac* is destroyed, the anterior one enlarges.

As to the danger of confounding ante-uterine hematocele with lateral hematometra and hematokolpos, we have already spoken of this under the subject of differential diagnosis.

HEMORRHAGES INTO THE PELVIC CONNECTIVE TISSUE.

a. *In connection with Pregnancy and Childbirth.*—Injuries to the genital tube during delivery may extend into the pelvic connective tissue. This is especially the case with incomplete ruptures, when the cellular tissue is lifted up to a large extent from its base, most often in the neighborhood of the neck of the uterus and the upper part of the vagina. In spite of the open wound there often occur extensive hematomata.

But hemorrhages may occur in various portions of the peri-genital connective tissue during childbirth, even without injuries of the genital canal; and the clinical picture will vary with the position of the ruptured vessels, as will also the extent and prognosis of the affection. If the reader will consider the injections latterly made into the peri-vulvar and vaginal tissue by W. Schlesinger, and the tumors he thus produced, he will at once comprehend the difference. We will give a short *résumé* of these experiments:

Puncture a few centimetres above the vaginal entrance, in a direction obliquely against the vaginal wall, and above the diaphragma pelvis.—When the canula was forced between the fascia pelvina, and C. Lauger's fascia endo-pelvina, a tumor was formed which bellied forward the corresponding portion of the vagina, being bounded above by the fascia endo-pelvina, and below by the levator ani with the fascia pelvina.

Only after it had flowed for some time, and an infiltration had formed between the vagina and rectum, did the injection mass pour over the fascia endo-pelvina into the sub-serous cellular tissue.

Puncture into the Ischio-rectal Cavum.—This space was first filled, and then the injection-mass easily passed through a fissure formed by the fascia of the R. obturator with the lower covering of the levator ani, without destroying the levator ani or the fascia covering it, into the sub-peritoneal cavum pelvis; and when it grew larger, it pushed its way in between the bladder and the uterus.

Puncture of the Middle of the Labium Majus.—The tumor formed was exactly similar to that seen in hematoma labium majus.

Puncture of Left Vaginal Wall .4 inches beyond the Hymen, in a Woman dead four weeks post-partum.—A tumor was at once formed, which soon rendered the vagina impassable to the finger, and reached behind the uterus towards the anus. In the anterior part of the pelvis the peritoneum was lifted up by the mass, flowing into the posterior portion of the left iliac fossa, and from thence into the mesentery of the S. romanum; towards the end the left ischio-rectal fossa was also infiltrated. The external genitals, the ala vespertilionis, and the upper portion of the broad ligament, and a portion of the neighborhood of the uterus, remained free from the injection mass.

Most authors have made a clinical distinction between thrombus vulvæ and vaginæ, making the boundary line between the two the diaphragm of the pelvis with its fascia; further clinical experience must tell us whether we can make further distinction.

We can distinguish the formation of blood-tumors in four places of the pelvic connective tissue:

Hematoma s. Thrombus Vulvæ s. Labii Majoris.—The tumor is usually egg to fist-sized, and is situated in the labium and vestibule, extending in extreme cases above to the mons veneris, and below to the perineum. Sometimes the location of the tumor is in the lower part of the labia; and from the bluish-red discoloration of the skin, in the neighborhood of the anus, we can recognize the fact that sanguineous effusion into the ischio-rectal space has occurred.

The vulvar thrombi never extend higher up into the vagina, since they are hindered by the muscular and tendinous structures of the diaphragma pelvis accessorium s. urogenitale, which are attached to the arch of the pubis.

The thrombus vulvæ is the most frequent of the non-dangerous forms. In tumors of smaller size the blood is often absorbed; in larger ones rupture into the vestibule usually occurs in a day or two.

Hæmatoma s. Thrombus Vaginæ.—This is rarer, and is characterized by the formation of a tumor in the vagina, which is usually limited by the diaphragm of the pelvis, and never extends into the vulva

A thrombus vaginæ is always a serious matter; and its extent can only be judged of by the extent of the patient's anæmia and the size of the vaginal tumor. It usually does not project above the pelvic brim, but sometimes it breaks through all anatomical limitations and extends up to the kidneys.

It is not usually absorbed. After a few days it generally opens into the lower portion of the vagina, or into the rectum

Hæmatoma Periuterinum s. Ligamenti lati s. Thrombus Ligamenti lati.—*Post-partum*, but few hemorrhages occur from the broad ligaments, while the cervix is intact. It occurs mostly as an extra-peritoneal blood effusion unconnected with pregnancy or the puerperal state; we will consider it later under its more usual designation of hematocele extra-peritonealis.

Hematoma s. Thrombus alæ Vespertilionis.—This is practically unimportant. Most frequently we can differentiate between these various forms of blood-tumor but occasionally hemorrhage occurs in more than one place at once, and in the severest cases the mass of blood may extend from the ischio-rectal fossa to the para-renal connective tissue

Etiology.—The causes of the affection are not quite clear. Vulvar thrombi occur before delivery, when the head is yet in the centre of the pelvis, and we see them after the simplest confinements.

Varicosities do not seem to be of influence in the causation of the hemorrhages

A. Kucher, from the records of Späth's clinic, gives a frequency of 4 cases in 6000; Winckel 1 in 1600

Treatment.—This will depend largely upon whether the affection occurs before or after childbirth. In the former case it is best to deliver quickly, if possible. Together with Dr. Kernecker, we extracted with the forceps a living child, which presented by the face, after a thrombus the size of one's fist had appeared in the right labium. The thrombus broke, and the hemorrhage was severe. Manual pressure continued for several hours, stopped it, and the walls of the thrombotic cavity quickly grew together. Probably the same result could be accomplished by the tamponade of the cavity with ferrated absorbent cotton or iodoform gauze.

If the thrombus is formed immediately after delivery, the birth of the placenta must be accelerated by pressure, and, following C. v. Braun, an ice-bag introduced into the vagina, while the uterus is carefully kept contracted. Clysters of cold water, and the introduction of small pieces of ice into the vagina, will aid us in our efforts. But the thrombus formation often continues until it reaches its anatomical limits.

All the thrombi which we have observed, with the exception of small ones, which were absorbed, opened in a few days. Those of the vulva broke sooner than those of the vagina. We several times successfully cleared out all the blood clots, and then thoroughly washed out the cavity three to four times a day with disinfectant solutions. In some cases we could introduce the tube to the depth of four and a half inches or more.

But incision and clearance of the cavity is always to be postponed for several days, until one is certain that no more hemorrhage is occurring. A 2 to 3 per cent. carbolic acid solution, or one containing iodoform, may be employed.

b. *Unconnected with Pregnancy or Childbirth.*—Considerable hemorrhages into the pelvic connective tissue only occur in non-pregnant women after traumatism of the broad ligament by instruments.

But though rare, all the above-mentioned forms of blood-tumor may occur. Hemorrhages below the diaphragm of the pelvis are seen after such injuries as falls upon the edge of a chair, etc. They are seldom larger than an egg in size.

We ourselves have seen two such traumatic thrombi, and several cases have recently been described by G. H. Benjamin Chunn.

The most frequent of these hemorrhages occur between the layers of the broad ligament and in the uterus and the vagina, more especially in the connective tissue behind them. They attain a size twice to four times that of a man's fist, occupy one or both broad ligaments, displace the vaginal vault more or less to one side, and sometimes project half a hand's-breadth or more above the pelvic brim.

On account of the great practical importance of this latter form we will describe it more in detail.

HEMATOMA PERI-UTERINUM S. LIGAMENTI LATI S. THROMBUS LIGAMENTI LATI S. HEMATOCELE EXTRA-PERITONEALIS.

We have seen that the vessels of the broad ligament may be the source of the hemorrhage in hematocele retro-uterina, and some of the autopsies recorded mentioned the presence of small effusions of blood between the layers of the ligamenti lati. From our own clinical experience we have no doubt that such hemorrhages often occur and are not diagnosticated. Voisin long ago described the condition under the name which Nélaton had introduced, "Thrombi of the broad ligaments." He saw many women in consequence of a coitus or sudden exertion affected with a tumor situated exactly upon one or upon both sides of the uterus. Most often the left side was involved. The tumors were soft and doughy, varied from the size of a nut to that of a fœtal head at term, were seldom accompanied by much pain, and did not always compel the patient to remain in bed

Small tumors of this kind situated in the broad ligaments cause very different symptoms from tumors situated deep in the connective tissue surrounding the vagina and uterus. They may vary much in hardness, in size, in position, and in motility. In spite of all the diagnostic aids of which we can avail ourselves, their recognition will always be very difficult, since the tubes and ovaries lie so near them, and an encapsulated exudate near the broad ligament or a little cyst of the ovary may cause a very similar tumor.

H. Beigel accidentally found a very beautiful example of the affection under consideration, while examining the uterus of a woman who had died of pneumonia at the age of thirty-two. He described it as hematocele alæ vespertilionis sinistræ. In the left broad ligament, at the lower part of the vascular ala vespertilionis, was an elongated, oval tumor, which began at the fundus uteri, and lay between the left tube and the round ligament of that side. The tumor was 3.2 inches long, measured at its broadest portion one inch, and was a mass of doughy substance, enclosed in a sac formed by the two layers of the broad ligament. The doughy substance was coagulated blood, and had not, apparently, been set very long.

The hemorrhages into the pelvic connective tissue occurring outside of pregnancy, childbirth, and the puerperium are more important.

The name of hematoma peri-uterinum is very appropriate, since most of them encircle the lower portion of the uterus more or less. Their symptoms vary with their size and position, and are often so like those of hematocele retro-uterina, that the two lesions can hardly be distinguished one from the other. There are but few pathological observations of this form of hemorrhage on record, since patients rarely succumb to it.

Schröder could cite but a single case of an extra-peritoneal blood effusion, which was confirmed by autopsy. The case was reported by Ed. Ott, and was accidentally found in a woman twenty-eight years old, who had died of typhus; and Luschka had made a median section of her pelvis. The effusion was as large as a small apple, and lay in the recto-vaginal septum towards the vagina, an inch or so from the bottom of Douglas's pouch. The remaining recorded cases of extra-peritoneal blood effusion by Prost (mentioned by Bernutz and Engelhardt), Trousseau, Simpson, Betschler and Robert, he considers unreliable in spite of the autopsies, since the records do not make it clear that the peritoneum formed the upper boundary of the tumor. The investigations of Kuhn in Professor Frankenhaüser's clinic in Zurich, have done much to elucidate the pathological anatomy of the condition, and have rendered the diagnosis of it possible under favorable conditions. In two of the reported sixteen cases, the diagnosis was made during life and verified at the autopsy.

A drawing of the specimen in question accompanies one of the cases, and enables us to understand the peculiar results of palpation.

We will give an abstract history of this case, and the drawing which accompanies it is reproduced in Fig. 31.

A woman forty years old, who had had one child fifteen years before, was attacked by violent pain in the lower abdomen, three days before her expected menstruation. The courses when they appeared were accompanied by great pain, and lasted in a moderate degree for three weeks. She was then examined at the clinic, there being no fever, but pain in the abdomen, and vomiting. When the plessimetre was pressed deep down into the abdomen, the percussion note a few finger-breadths above the pubis was dull. Deep palpation revealed the existence in either ilio-cæcal region of a doughy, somewhat painful tumor; the left was somewhat harder than the right. Between the two tumors was a median less prominent swelling, which was easily recognized to be the uterine body; it was to be felt three finger-breadths above the symphysis. The lateral tumors were immovable, smooth, and about the size of a fist. The median one was half that size. Some blood still flowed from the vagina, the introitus was not livid, and there was slight prolapse of the anterior vaginal wall.

Internal examination showed that the vaginal portion was displaced entirely forward; it was thin and tapering, the os being felt as a slight depression. The anterior vaginal vault had almost disappeared; there was no tumor above it; and the body of the uterus could not be felt. The posterior vaginal vault was deeply depressed, and was filled with a tumor about the size of two fists, not very tender and not everywhere of equal resistance to the touch. Its general feeling was doughy, though it was harder in spots. Fluctuation was nowhere perceptible.

Bi-manual examination showed that the swelling felt externally was completely connected with the tumor discovered in the posterior vaginal vault; and the latter was proved to be attached to the uterus. The womb lay in front of the tumor, and was curved back over it; hence the forward projection of the cervical portion. Pregnancy could already be excluded.

The sound could not be passed with its normal curvature, but had to be introduced almost straight, and with its point directed backwards. Uterus 4.4 inches long. The womb was fixed immovably to the anterior wall of the tumor, and elongated by it.

Bi-manual rectal examination gave no further information, and it was not deemed advisable to introduce the whole hand.

The patient died seven days later after puncture of the left vaginal vault had been done for symptoms indicating perforation of the tumor into the abdominal cavity.

The necropsy was done nine hours after death, and showed peritonitis and the presence of about five ounces of a reddish brown, foul-smelling fluid in the right ovarian region. The pelvic entrance was filled with a mass (*vide* Fig. 31), formed of the uterus, at the back of which was an elastic tumor (c). From this tumor projected two distinctly separated lateral swellings, which occupied the region of the broad ligaments (b. and d). The tumor in the right broad ligament was not adherent to the posterior pelvic wall; it was formed by a dilatation of the posterior peritoneal layer of the right broad ligament, the blood accumulation having taken place between the anterior and the posterior layers.

The posterior layer was much more tense than the anterior one. In some places it was extremely thin; and where it was attached to the ovary and the tube was an opening, the edges of which were as thin as paper. Here the blood had poured into the abdomen, and had caused peritonitis.

While the posterior layer was formed almost entirely of peritoneum alone, the anterior one contained the vessels and the muscular tissue of the broad ligament.

The right ovary lay against the posterior layer; up to its hilus, or up to the region of the ala vespertilionis, the division of the layers was complete; it contained a large corpus luteum. The right tube was normal, though displaced somewhat forward; the fimbriated extremity was adherent to the dilated broad ligament; so that though the fimbriæ could be recognized, the ostium abdominale could not be found. At the place where the peritoneum passed from the right broad ligament to the uterus there were occasional adhesions to the posterior wall of Douglas's *cul-de-sac.* The hemorrhage had loosened the peritoneum from the uterus in a peculiar way, so that the cavities formed communicated with the cavities in the broad ligaments.

In the left broad ligament the conditions were somewhat different. It posterior surface was mostly adherent to the pelvic peritoneum; and the entire peritoneum of the floor of Douglas's *cul-de-sac,* and even of the posterior bladder wall, was detached by the effusion of blood. The posterior wall of the sac was formed by the muscular layer and connective tissue of the broad ligament. The effusion filled not only Douglas's sac, but also the left and even the right sacro-uterine ligaments had been denuded of peritoneal covering by it. The entire floor of the pelvis was lifted up; but there was no trace of pus.

A second swelling (e) lay just in front of this left-sided tumor. Its wall was formed by the anterior layer of the broad ligament, and not by the floor of the pelvis. There were no adhesions to the lateral pelvic peritoneum. Both tumors had for a common basis the thickened muscular layer of the left mesometrium with its vessels. Through a small opening in this common basis these tumors communicated with the other cavity.

The left Fallopian tube ran along the furrow which marked externally the place of division between the two tumors; and the left ovary lay on top of the posterior sac.

Thus all three cavities were in communication. It was evident that the process had begun on the left side, where the adhesions were firmest and the coagula oldest. Possibly the ovary, which was intimately united

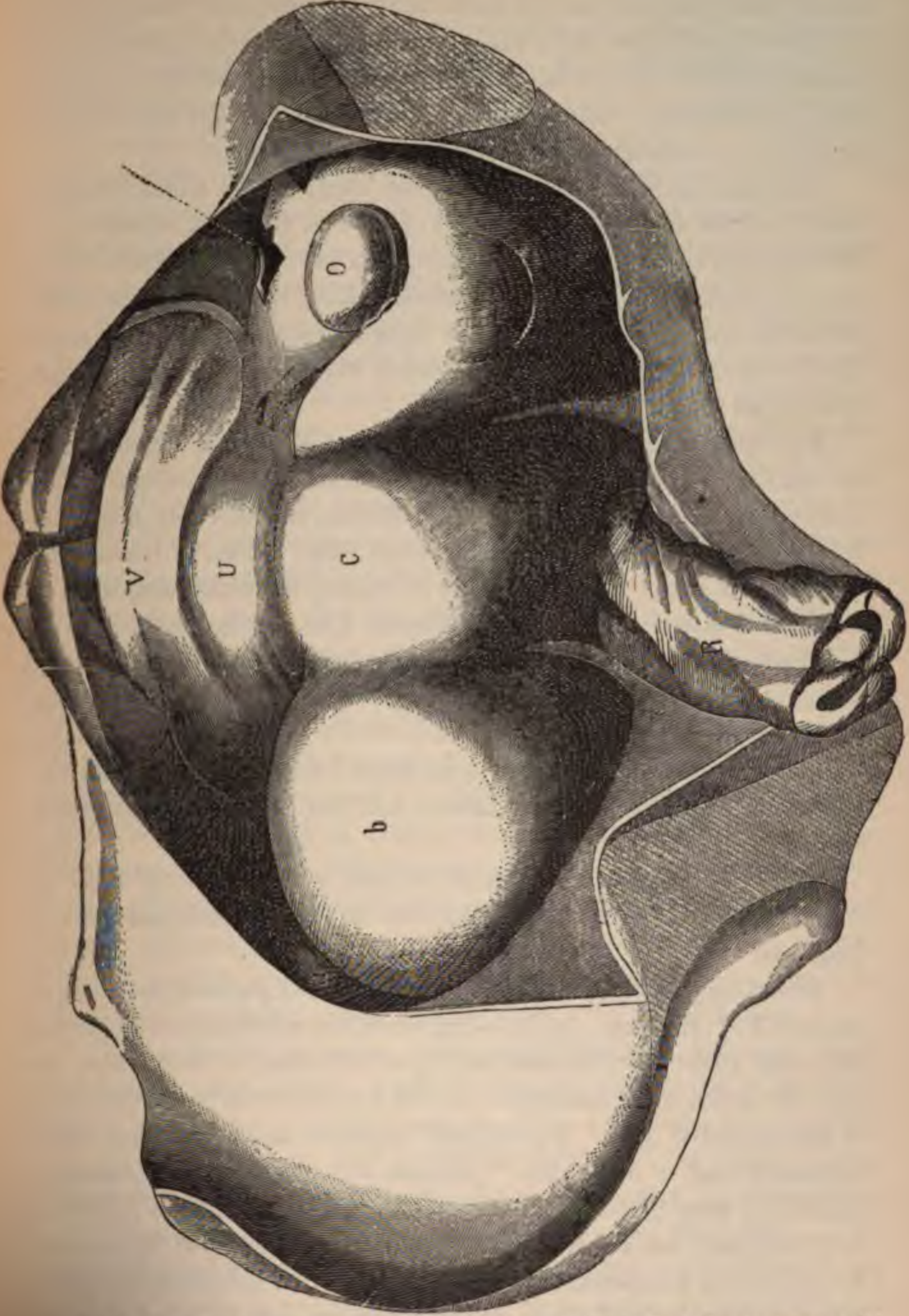


FIG. 31.—HÆMATOMA PERIUTERINUM FROM *Jakob Kuhn*. (Clinic of *Prof. Frankenhaüser.*) *U*, uterus; *V*, bladder; *R*, rectum; *C*, subperitoneal blood tumor behind the uterus; *b*, *d*, lateral blood-tumors of the broad ligament; *e*, point of perforation.

to the walls of the sac, was the source of the hemorrhage. Not only was the entire uterus lifted out of the pelvis by the effusion, but it was turned concavely backwards over the top of the sac. The uterus was 4.4 inches long, and somewhat twisted upon its own axis. The left sac had the thicker wall, it containing everywhere a muscular coating.

The right tumor was as large as a goose's egg; the left a little smaller; while the third was as large as a hen's egg. The fact that adhesions to the pelvic peritoneum are seen only over the left posterior tumor show that very probably during previous menstruations the left ovary and the left broad ligament had been united to the pelvic peritoneum by peritonitic adhesions; for no signs of peritonitis were seen during the present sickness till shortly before death.

According to their situation and to the intensity of the hemorrhages the effusion will be found in the broad ligament, or in the cellular tissue in front of or behind the uterus. The effusions on either side may communicate by a narrow, tongue-like bridge either before or behind the womb. The tumor will be partially or entirely dumb-bell-shaped, as is represented in several schematic drawings in Kuhn's monograph.

The fascia endopelvina will limit these hemorrhages below; while more considerable hemorrhages will distend the vagina, dilate the orifices and cavities of this fascia, and, pressing the elevator ani downwards, will finally be limited by it. A. Martin has done much by his laparatomies to increase our knowledge of these tumors, and has laid stress upon their frequent unilateral occurrence.

So far as we know the etiology of the affection is almost the same as that of hematocele retro-uterina, and does not give us much assistance in diagnosis.

According to Kuhn the early retrograde metamorphosis of the internal genitals is of influence. In three-quarters of the reported cases of hæmatoma the women were prematurely aged individuals of from thirty to forty-five years, while hematocele is most frequent from the twenty-fifth to the thirty-fifth year. Undoubtedly traumatic influences much more frequently lead to hæmatoma. Nor are the symptoms of hæmatoma exactly the same as those of retro-uterine hematocele. Both affections occur suddenly, are accompanied by great pain, are followed by anæmia, and happen at a menstrual epoch after a period of profuse and painful menstruation; but the pains of hæmatoma are said to be rhythmical even when very severe. This Frankenhaüser holds to be characteristic of peri-uterine hæmatomata. It is also to be noted that there occurs no rise of temperature after the hemorrhage. A second attack, and often a third, follows at successive menstrual epochs, and the hæmatomata take two months or more to disappear, according to their size. They need not entail sterility, since the uterus may regain its complete mobility.

Diagnosis.—There is not the slightest doubt that a hemorrhage into the female pelvis once recognized, it is possible under favorable circumstances to decide whether the effusion is intra- or extra-peritoneal.

We will follow Frankenhaüser in the diagnosis between hæmatoma and hematocele. He holds that it is easy to decide if the blood is extra-peritoneal, if the patient is seen early in the sickness. He succeeded in proving the intra-peritoneal position in several cases by putting the patient in the knee-and-elbow position. The blood flowed out of Douglas's *cul-de-sac,* to resume its place when the patient lay upon her back. If the blood is extra-peritoneal, it forms from the very beginning a consistent tumor, and is accompanied by the above-mentioned severe bearing-down pains. But the physician will hardly be in a position to make so thorough an examination of the patient during the first hours of the sickness, and the point has little practical interest.

A second characteristic lies in the shape of the tumor, and its relations to the uterus, as Martin has noticed. If a tumor suddenly appears at one side of the uterus from which a *bridge* appears to stretch to the other side, there is very probably an extra-peritoneal blood effusion. This bridge may be in front of or behind the uterus, and if it unite two lateral tumors which project above the level of the organ, it is characteristic of hæmatoma. It is very important when the tumor is unilateral to decide whether there is a bridge which can be followed towards the other side, as was the fact in the case shown in Fig. 31 and in two other recorded cases.

The surfaces of the tumor, and especially the lower one, may be important for the diagnosis. From the irregular distribution of the blood in the connective tissue, the lower side of a hæmatoma is uneven and rough, and the tumor may project far down into the vagina, getting smaller as it descends. In hematocele, on the contrary, the lower surface is at first entirely flat. From the abdominal walls hæmatoma appears smooth, since the loosened peritoneum forms a sharp boundary for it; and the uterine adnexa will be demonstrable at its apex. In hematocele, on account of the inflammatory reaction that occurs, there is seldom a sharp outline perceptible.

The position of the uterus itself may be higher or lower in different cases of either disease. But in unilateral hæmatoma the uterus is not only pushed to one side, but will be found placed upon the tumor; though occasionally when Douglas's pouch is large and the vagina wide, the same condition of things will be found in hematocele.

Finally, it is stated that the neck of the uterus is mechanically elongated by the tension of the effusion, and retains its mobility to some extent; and that in hæmatoma there is no fever or other symptom of peritonitis.

Treatment.—The prognosis and treatment of hemorrhages under the pelvic fascia coincide exactly with that of thrombi after child-birth. For smaller tumors situated over the fascia pelvis, the principles are the same as those laid down for hematocele retro-uterina. In the case of larger tumors, when rupture into the abdominal cavity is threatened, Frankenhaüser recommends puncture from the vagina, or incision. The proposal of Zweifel will also be found useful if operative interference is considered necessary.

Laparotomy in Hæmatomata.—In the case of large pelvic hæmatomata, when an operation is indicated, A. Martin has given some very good and sufficient reasons for the performance of laparotomy. He has always found extra-peritoneal blood, and has several times recognized the covering as peritoneum under the microscope. Now whether there is a peritoneal coat in the covering or not is not of much importance for the vaginal operation, since hematoceles, even when of long standing, are usually separated by strong pseudo-membranous layers from the abdominal cavity; but laparotomy in the case of hematoceles, and we must be prepared to meet them in these cases, is difficult, if not impossible.

A. Martin's results, especially those published by Düvelius, are very remarkable. Of the first four cases operated on, which belonged to a less strictly antiseptic period, two died; of the last four operated on, none died. The course of the operations was simply this: Laparotomy; eventration; loosening and division of adhesions between tumor and intestines; opening of tumor; cleansing of cavity from blood coagula; scraping of the walls and corners of the cavity; drainage, with cross pieces through the vaginal vault; attempt to close the cavity from the abdominal cavity suture (usually fails from the softness of the walls).

THE FREE HEMORRHAGES.

From any of the parts which are the source of the bleeding in hematocele retro-uterina there may occur a rapidly fatal hemorrhage if the vessels of the part have undergone morbid change or enlargement. Many cases have been related by such competent observers as Scanzoni, Puech, Hufeland, and others, in which hemorrhages from the ovaries or the tubes have rapidly caused the patient's death; as also have varicosities of the ovarian veins. One of the rarest cases is probably that of Fritsch, where a pregnant woman bled to death so quickly from a sharply defined ulcerated spot the size of a ten-cent bit in the posterior uterine wall, that she might have had rupture of the uterus. As has been mentioned, the commonest cause of internal hemorrhage is the rupture of an extra-uterine fœtal sac.

Symptoms and Diagnosis.—In most of the recorded cases death occurred within the first twelve hours; and the fact that many of them were supposed to be cases of poisoning shows that the symptoms were not so characteristic as one would suppose in a disturbance of such extent. The physician in most cases first saw the patient senseless or entirely collapsed, with a small, hardly perceptible pulse, and a cold, white skin. A further source of difficulty for the diagnosis is that when much blood has been effused, it spreads itself throughout the entire abdominal cavity, and so can hardly be detected.

In all cases the first symptom was pain, sometimes so violent as to make one think of the advent of a peritonitis.

Thereupon soon follow pallor of the face, frequent gaping, singultus and vomiting, a small and rapid pulse, coldness of extremities and face, in fact all the symptoms of violent *post-partum* hemorrhage.

Thus the diagnosis of internal hemorrhage will often be incomplete when we have not before detected the existence of perhaps an extra-uterine pregnancy, or when a skilled observer has not watched the affection from the beginning.

CHAPTER VII.

NEW GROWTHS OF THE BROAD LIGAMENTS, AND OF THE PELVIC CONNECTIVE TISSUE, AND ECHINOCOCCUS-CYSTS.

CYSTS.

WE frequently find cysts from the size of a pea to that of a pigeon's egg upon the broad ligaments, but they are only of pathologico-anatomical interest. Their walls are mostly thin, and they contain a watery or pale yellow fluid. They may be upon the surface of the ligaments, or distinctly situated between its folds.

Superficial cysts seem generally to be unconnected with the parovarium. Klebs believes that these structures, whose thin wall is covered upon its inner surface with a simple layer of polygonal epithelial cells, are caused by the rupture of a follicle and extrusion of the ovum and the follicular epithelium; and he calls them superficial cysts of the broad ligaments.

The cysts situated between the layers of the broad ligament are often pedunculated structures, and are very similar to Morgagni's hydatids. Only exceptionally do they attain any great size. According to Rokitansky, these cysts arise from stricture of some part of the parovarium.

Parovarian cysts sometimes grow to be as large as ovarian cysts. See Olshausen, "Diseases of the Ovaries."

MYOMATA, FIBROMATA.

Klob considered it doubtful whether fibroids could be developed in the broad ligaments, and he regarded the recorded instances as cases where fibromata of the uterine wall developed towards the ligamenta lata. Kiwisch has devoted much attention to the subject, and he believes fibromata in this situation to be very rare, and of but small size. He always found that the tumors arose from the lateral portions of the uterus, and had gradually, in the process of growth, became detached from that organ, save perhaps only for a thin pedicle. Virchow also is doubtful as to their primary occurrence, and appears to have only seen small specimens. Kiwisch has observed them as large as the two fists.

It does *à priori* appear probable that since the same smooth muscular fibres and connective tissue are found in the broad ligaments as exist in the uterus, myomata and fibromata and sarcomata could occur in the one as in the other. In the last few years a number of large tumors have been removed from the broad ligaments. Thus was the one by Schmid, in Breisky's clinic; one by Mikulicz, and one by v. Buschmann in Billroth's clinic, and others. In 1882 M. Sänger collected eleven such cases, and proved the primary origin from the broad ligament of a case upon which he operated himself. W. A. Freund also describes three cases which belong here.

We may also mention the accessory ovaries whose existence Waldeyer and Beigel have proven. They are not uncommon at the peritoneal boundary-line of the ovary, and are from a pepper-corn to a cherry in size. They may often have been mistaken for fibroids.

PHLEBOLITHS.

The broad ligaments are often the seat of venous ectasias, and, according to Klob, there is hardly another place where phleboliths are so common. He believes this is because of the exceptional occurrence of valves in the veins of the ligamentum latum. We have seen these vein-stones the size of a bean or pea. They may cause inflammation, and thrombus formation. Barnes ascribes to them an influence in determining the early atrophy of the uterus.

CARCINOMATA AND SARCOMATA.

Carcinoma usually occurs in the broad ligaments and the pelvic peritoneum in connection with similar disease of the general peritoneal sac. Occasionally an ovarian carcinoma may spread to the broad ligaments, or a cancer of the uterus may spread into the neighboring peritoneum and connective tissue. Carcinoma originating in the rectum or the bladder may attack the pelvic connective tissue, and so reach the uterus. According to Klob, E. Wagner's case is unique, in which a cancroid commenced in Douglas's pouch, and spread to the uterus.

The carcinomata are of practical importance on account of their grave prognosis, and because of the ease with which they may be mistaken for other tumors arising from the pelvic walls or some spot in the sub-peritoneal tissue.

We have several times observed the affection together with cancerous disease of the retro-peritoneal glands of the posterior pelvic wall. In two cases the disease began insidiously, and without its dangerous character being in the least suspected. There occurred attacks of pain in the abdomen, loins, and back, which afterwards became more violent and continuous. During three months, in which the patient lost flesh rapidly, and could neither eat nor sleep, repeated examinations were made by several physicians, without finding any cause for the pain. It is interesting to note that in one of these cases, the disease was chiefly confined to the glands of the left side of the body; three months after the affection began, small tumors could be felt near the uterus and the left upper extremity; the side of the face, then the left lower extremity and the left side of the thorax and the pelvis became œdematous, and there remained a hard œdematous swelling of the left side of the body, exactly limited to the middle line. Death occurred in both cases about eight months after the beginning of the affection.

(Concerning new growths, myomata sarcomata and carcinomata, which have spread from the uterus to the parametrium, see Gusserow.)

TUBERCULOSIS.

This process only occurs in the pelvic peritoneum, in connection with tuberculosis of the uterus, tubes, and general peritoneum.

PARASITES.

Echinococcus.

Echinoccocci have been found fairly frequent in the female pelvis. According to F. Winckel, Neisser up to 1876 collected 44 cases, and Davaine 13; while Wiener has six cases, including one of his own, in which these tumors formed obstructions to delivery. From the collective investigation of the Mecklenburg physicians, we learn the great difference that exists between its prevalence in different places, and its common occurrence in their own country. Very recently W. A. Freund has written a very thorough monograph upon echinococcus disease of the female pelvis, including therein four cases observed by C. Schröder. Freund had already read a paper at the *Naturforschersammlung* at Baden-Baden, based on eighteen of his own cases, most of which had been verified by *post-mortem* examination. Fr. Schatz has also discussed the subject lately; he has seen five cases himself, and insists upon its frequent occurrence in the female.

Since we have never ourselves seen a case of echinococcus disease in the female pelvis, we will simply follow W. A. Freund in our description.

The echinococcus may reach the pelvis primarily as an embryo, or secondarily as a fully developed parasite by emigration from higher seated organs. It occurs primarily in the pelvic connective tissue, and always at its posterior part, near the intestines and the bones.

The parasite wanders along the connective-tissue planes, getting from the paraproctium into the parametrium and the uterus, into the paracystium and so to the bladder, into the sub-serosium, and to the iliac fossa. It leaves the pelvis through the sciatic fissure and the lacuna musculorum and vasorum, under Poupart's ligament. Upwards it goes below the parietal peritoneum of the anterior abdominal wall; while below it stretches the structures of the pelvic floor, and almost seems to lie upon the perineum. It is important for the differential diagnosis, that the parasite pushes its way under the peritoneal covering of the organs, especially of the uterus, and is exceedingly often found between the cervix and laquear vaginæ posterior and the rectum. The pelvic connective tissue in the neighborhood of the parasite is in a condition of chronic inflammation.

The echinococcus may be borne in the female pelvis for many years without disturbing the general health, and even without causing local trouble. In very many cases death results from the presence of the parasite in some other organ.

The diagnosis may be made with great probability in the early stages of the affection, when the following condition of things is found: there are one or more round, very smooth, tense and elastic tumors in the postero-lateral portions of the pelvis near the rectum, and in the pelvic connective tissue near the wall of the cavity. They are but slightly movable, and not tender. They have no connection with the uterus and its appendages, and the ovaries can be felt to be normal. Finally, local symptoms are absent, and the general health is undisturbed.

A positive diagnosis is to be made by the examination of fluid which has come from the tumors, either spontaneously or after puncture; and Freund warns us of their great danger. The geographical distribution of the disease will also help us in doubtful cases.

The treatment consists in a free opening of the sac, and the evacuation of the parasites. If the tumor is in the greater pelvis or the abdomen, laparotomy is our best resource. If we succeed in completely scooping out the mother sac, which is seldom the case, the wound is to be treated in the same way as after the removal of intra-ligamentous tumors. In other cases the site of operation must be sewn to the abdominal wall, and the cavity be plugged or drained. If the parasite has not grown above the lesser pelvis, Freund only advises operative interference when it causes considerable local trouble. The sac should be freely opened from the vaginal vault, and the wound treated antiseptically.

Atrophy of the Pelvic Connective Tissue.

Besides the atrophy of the pelvic connective tissue, caused by promatritis chronica atrophicans, W. A. Freund described a simple atrophy affecting it, which occurs in wasting diseases, hemorrhages, too frequent childbirth and lactation, and finally after severe puerperal processes. Freund believes that the atrophy due to the latter cause always occurs together with atrophy of the uterus, while that from the former causes are seen with nearly normal womb. Freund considers this simple atrophy to be a cause of hysterical symptoms.

DISEASES

OF THE

External Female Genitals and Lacerations of the Perineum.

BY

PAUL ZWEIFEL, M.D.,
PROFESSOR OF OBSTETRICS AND GYNECOLOGY AT ERLANGEN.

CHAPTER I.

THE DEVELOPMENT OF THE EXTERNAL FEMALE GENITAL ORGANS.

THE external genitals of the female are anatomically sharply bounded. In the virgin they are separated from the vagina by the hymen, and they consist of hymen, meatus urinarius, Cowper's or Bartholin's glands, labia majora and minora, clitoris, and perineum.

In order to understand the occurrence and importance of anomalies of these organs, we must preface their study by a sketch of the normal developmental phases.

The genital organs of the male and of the female are derived from a common stock, and so far as we are able to determine there exists primitively absolutely no difference between them. Both are derived from the Wolffian bodies, Müller's ducts, and the genital glands.

In Fig. 32 is represented the Wolffian bodies of a male embryo at the thirty-fifth day. These bodies are rightly designated the primitive kidney, seeing that its secretion contains urea, and its duct opens into the channel for the urine. The Wolffian bodies develop very early in the life of the embryo, and consist of two large glands, one on each side of the spinal column. They are the largest of the fœtal organs in the early months. They are made up of a number of transverse canals, which open into a lateral duct. On the inner border next to the spine lie the genital glands (ovaries and testicles). Further outward and on the anterior surface of the Wolffian bodies develop the ducts of Müller. Both are hence not far from one another. Later they are separated from the primitive kidney by folds of peritoneum.

The permanent kidneys develop behind and above the Wolffian bodies, and are not concerned in the development of the sexual organs. Their ducts, the ureters, extend from them to the bladder.

The lower part of the urinary apparatus—that is to say, the bladder and the urethra—is formed by the allantois, which is a diverticulum from the embryonic rectum. This organ plays an important part in the formation of the placenta, in that it carries two arterial branches from the umbilicus to the placenta. Further than this statement we are not concerned with the allantois. The diverticulum is known as the urachus, and later the median ligament of the bladder. It is not possible to follow the development and inter-communication of the various organs as Henle has done, and we reproduce here his illustrations.

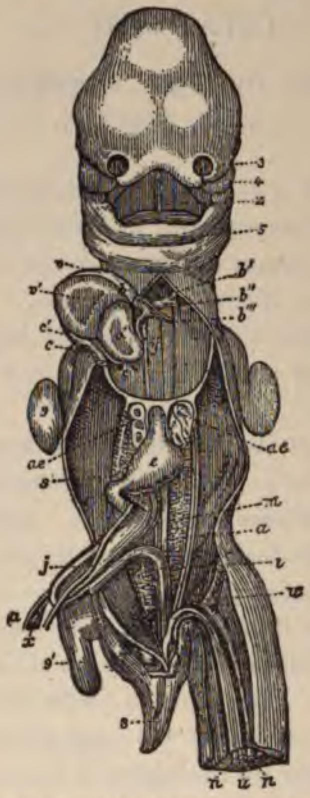


FIG. 32.—MALE EMBRYO OF 35TH DAY. (After *Coste.*) 3, left external nasal process; 4, superior maxillary process of the first branchial arch; 5, primitive inferior maxilla; 2, tongue; *b*, bulb of aorta; b', beginning of ascending aorta; b'', 2d aortal arch; b''', 3d aortal arch; *c*, body of superior cava and azygos dextra; c', general vein sinus of the heart; c'', body of superior cava, and left azygos; o', left auricle; *v*, right, and v' left ventricle; *ae*, lungs; *e*, stomach; *j*, left omphalo-mesenteric vein; *s*, body of the portal vein; *x*, yolk vesicle; *a*, right omphalo-mesenteric artery; *m*, Wolffian body; *i*, rectum; *n*, umb. art.; *u*, umb. vein. (The white lines on the inner side of the Wolffian bodies are the genital glands, and the double lines outside are Müller's ducts and the urinary canals.)

The Wolffian bodies develop as we have stated on each side of the ver-

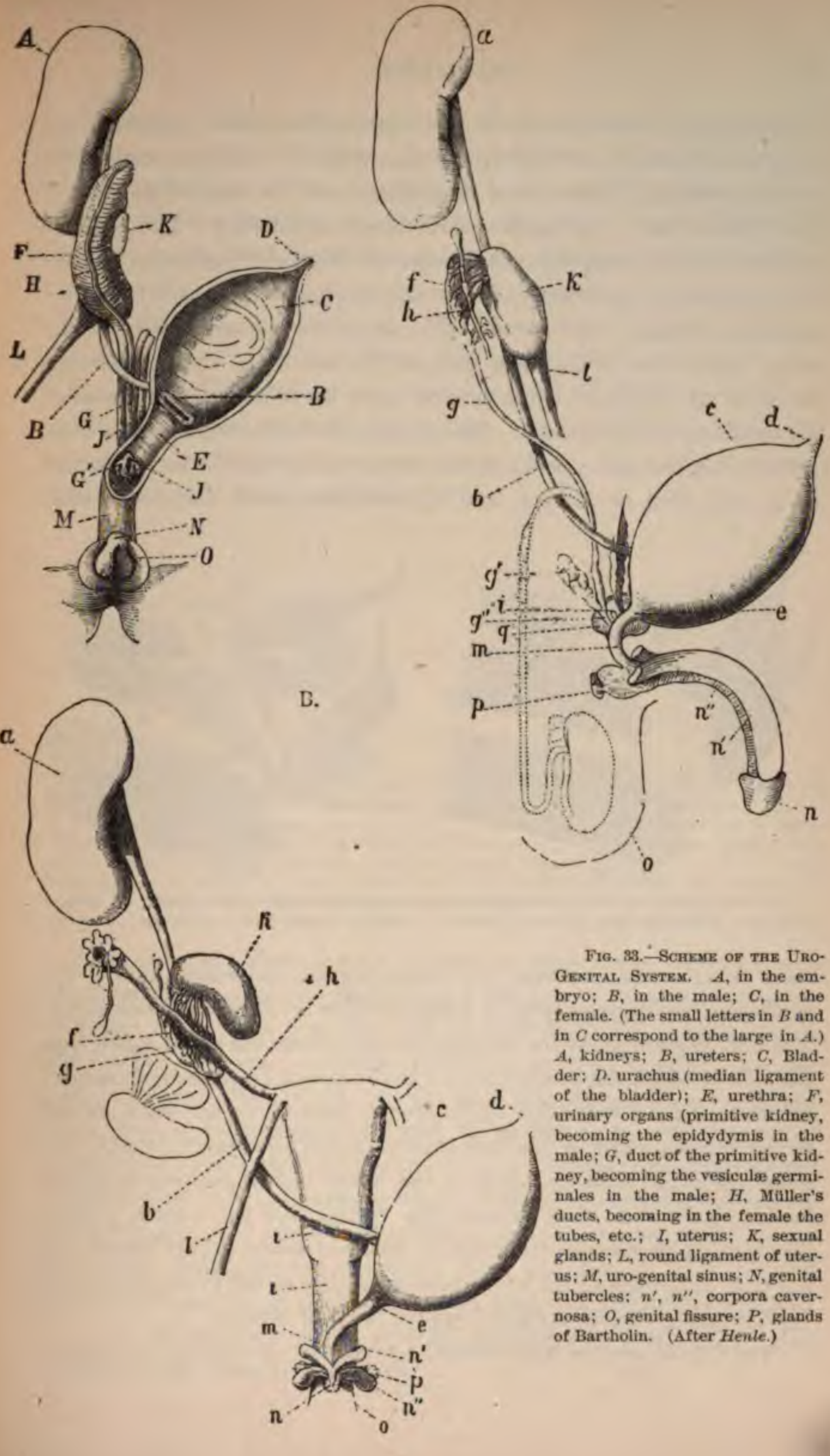


FIG. 33.—SCHEME OF THE URO-GENITAL SYSTEM. *A*, in the embryo; *B*, in the male; *C*, in the female. (The small letters in *B* and in *C* correspond to the large in *A*.) *A*, kidneys; *B*, ureters; *C*, Bladder; *D*. urachus (median ligament of the bladder); *E*, urethra; *F*, urinary organs (primitive kidney, becoming the epidydymis in the male; *G*, duct of the primitive kidney, becoming the vesiculæ germinales in the male; *H*, Müller's ducts, becoming in the female the tubes, etc.; *I*, uterus; *K*, sexual glands; *L*, round ligament of uterus; *M*, uro-genital sinus; *N*, genital tubercles; *n'*, *n''*, corpora cavernosa; *O*, genital fissure; *P*, glands of Bartholin. (After *Henle*.)

tebral column. Towards the centre develop the genital tubercles, and more to the outside and above, over the primitive kidneys, stretch the ducts of Müller. These latter lie between and in front of the duct of the Wolffian body, and unite below, eventually fusing. The separate primitive kidneys and the united canal of Müller's ducts open into the lower portion of the allantois, below the bulging of the bladder, and become the urethra. The ureters, the ducts of the permanent kidneys, develop higher up in the wider part of the allantois, which ultimately becomes the bladder. Thus then we have the differentiation between the urethra and the bladder. Still further, Müller's ducts end in a canal which, from the entrance site to the surface of the body, is as well rectum as genital canal or urethra, and is, therefore, called the cloaca, until there occurs union between the rectal, vaginal and vesical walls. The accompanying diagrams (Figs. 34 and 35) show the division of this cloaca. The first diagram shows the allantois springing from the rectal canal, from the side of which the ureter opens. In the second diagram is represented schematically the formation of the rectal, vaginal, vesical walls, as well as the hymen, which is the termination of the recto-vaginal wall. The hymen is indeed nothing else than the result of the growing up of the border of the wall lying between the rectum and the vagina. Dohrn says it exists on account of primitive excess of tissue. The hymen does not arise at the site of the uro-genital sinus, but at the lower part of the vaginal canal, which is formed from the ducts of Müller.

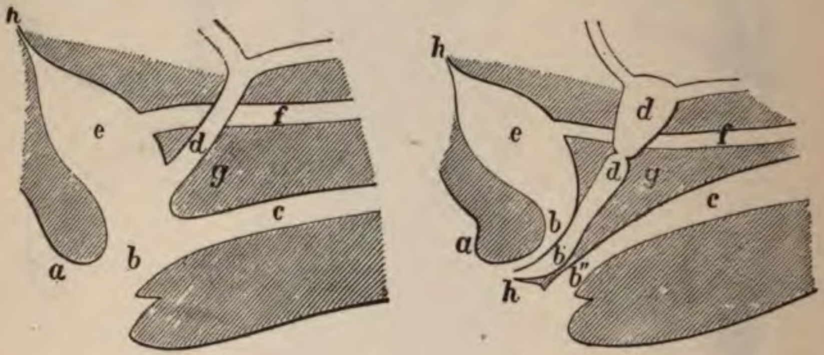


FIG. 34. FIG. 35.

FIGS. 34 and 35.—*a*, Genital tubercle; *b*, Sinus uro-genitalis, urethra; *b'*, vagina; *b''*, anus; *c*, rectum; *d*, Müller's ducts; *e*, bladder; *f*, ureter; *g*, posterior vaginal wall; *h*, perineum.

The development of the external genitals is to be sought in the genital tubercle. This tubercle appears in the sixth week of the life of the embryo, according to Kölliker. It soon splits into two. At the expiration of two more weeks the development of this tubercle is well advanced. In the middle a partition has arisen between it and the opening of the cloaca. In the third months the cloaca has disappeared as such, and the rectum and vagina have been formed. At the end of the third month differentiation in sex has begun. While in the male the genital tubercle becomes the penis, and the genital furrow the urethra, and the sexual folds behind have formed the scrotum, in the female the furrow grows larger and larger, and eventually divides. These divisions remain open, and are the rudiments of the labia majora and minora. The tubercle itself becomes in the female the clitoris.

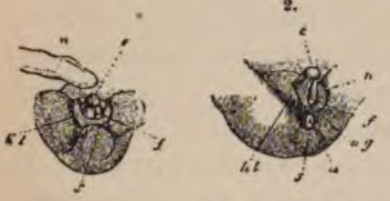


FIG. 36.

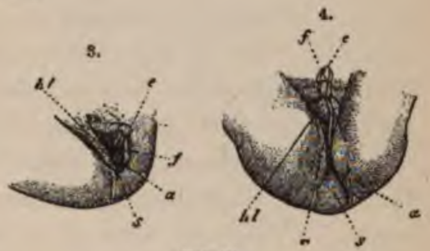


FIG. 37.

FIGS. 36 and 37.—THE DEVELOPMENT OF THE EXTERNAL GENITALS. (After *Ecker*.) 1. External genitals of a human embryo of about the eighth week. (× 2). *e*, clitoro-penis; *f*, genital furrow continues with the uro-genital sinus; *hl*, genital folds; *s*, cloacal opening; *n*, umbilical cord. 2. External genitals of a human embryo of about the tenth week. *a*, anus; *ug*, opening of the uro-genital sinus; *n*, border of the genital furrow, or the labia minora. (Remaining letters as in 1.) 3. External genitals of an embryo, 2″ long, multiplied twice, in a stage following on 2. Differentiation of sex not yet accomplished. 4. Male embryo, external genitals, at end of fourth month. (Letters as above.)

The essential difference then between the sexes lies in the fact that in the female the uro-genital sinus is not formed from the genital tubercle, and that the urethra does not open into the separated tubercle, but in the uro-genital sinus. A similar difference exists in regard to the corpora cavernosa in both sexes. In the male they surround the uro-genital sinus, even as the genital furrow and the genital folds unite posteriorly. In the female they only cover the anterior border. One pair of the corpora unite into the two corpora cavernosa clitoridis under the pubic rami, while the other pair, the corpora cavernosa of the urethra or vestibule, surround the opening of the uro-genital sinus and lie with their posterior side free and ending at the antero-lateral border of the introitus vaginæ.

Into the anatomy of the external genitals we cannot enter. The essentials have already been stated.

CHAPTER II.

DEVELOPMENTAL ANOMALIES OF THE EXTERNAL GENITAL ORGANS.

ENTIRE absence of the external genitals is the rule in acephalic fœtuses and in sirens. The reason is apparent, for in the first monstrosity the entire body remains in a very primitive stage of development, and in the latter the lower extremities are not normally applied, nor is the lower segment of the body well developed. Naturally, therefore, both the external and the internal genitals are wanting.

On the other hand those observations are of special interest where in the presence of well-formed internal genitals there was no trace of the external. There does not really exist a single authentic instance of such an anomaly. Such cases have certainly been described, but in many it is apparent that the condition was not absence but union between the external genitals. We recall Magee's case, cited by Kiwisch, where the urethra was lacking and the urine was excreted by the urachus at the umbilicus. The young girl was aged eighteen, and suffered intensely from dysmenorrhea, for the relief of which Magee made an opening at the site where the vulva appeared to be and gave exit to the retained blood. We consider that in this case there existed simply union of the parts, dating from the latter part of intra-uterine life, and leading to patency of the urachus.

There are instances recorded where only a funnel-shaped depression was present at the site of the labia, or else a small urinary meatus, or not even this. Where it is question of absolute absence of the external genitals it has never been proved with certainty that the internal genitals were normally developed. Riolan has recorded two cases where the left labium majus was lacking, and yet there was no trace of cicatrix. Kussmaul records in his classic work on absence, etc., of the uterus, a case of Rossi's, where the vagina, however, existed as a minute opening. The other genitals are not referred to. Certainly the most recent case, that of Foville's, does not belong in the category of absence of the external and development of the internal genital organs. The description concerns an individual at maturity, who menstruated through the urethra, and thence it was inferred that the internal genitals were completely developed. The clitoris, labia, nymphæ were absent, the vestibule was closed in front. Only a minute opening was present, which was recognized as the outlet of the uro-genital canal, from the fact that both urine and menstrual blood issued from it. Between symphysis and anus there existed a species of raphé in the mid-line, and the above-mentioned minute opening. In the explanation of this case, Förster states that it is important as proving that we are dealing with fusion of the labia majora, while Klob claims that there was fusion at the raphé. The latter view is the most plausible, since a raphé is the result of the union of two previously separate parts, as, for example, the raphé of the scrotum. The same explanation will apply to Ashwell's case. Meckel has cited old cases of absence of all the genital organs. At the site of the external genitals, there existed either a depression, or else an elevation, or else the skin covered the site unaltered. We refer to these instances since we wish to point out the contrast between them and Foville's case. If his case is not a genuine one of the kind we are speaking of, there is recorded none other where the urethra and internal genitals were present, and the external genitals absolutely absent. This is so much the more important, seeing that the genital tubercle is never absent (except in sirens and sympodiæ), and that the malformations of the external genitals are to be explained by the greater or less development of the genital furrow, or else by fusion

When the external genitals are entirely absent in the fœtus, then naturally the canals, which normally arise from the genital furrow, cannot open at the surface, but must remain as in the embryonal stage, intercommunicating. Such a great malformation must be incompatible with life. As a rule, it is found only in premature fœtuses, which are either still-born or succumb shortly after birth. Certain questionable cases have, however, been recorded where individuals without anus or meatus urinarius have survived. I believe them to be so unauthentic that I make no further reference to them.

From cases of absolute absence I differentiate sharply those of non-development of all or of portions of the external genitals.

In case of marked extrophy of the bladder, the labia majora are as a rule undeveloped, and are purely little flaps of the integument. There exist, however, cases of lack of development, aside from this malformation. Seggel cites Pear's and Morgagni's cases of abnormal smallness of the genitals, the one in case of a young girl, the other in case of a sterile woman. In all the external genitals were undeveloped. Coste also reports a case where, in a girl of twenty-one, the labia majora were rudimentary and the clitoris enlarged.

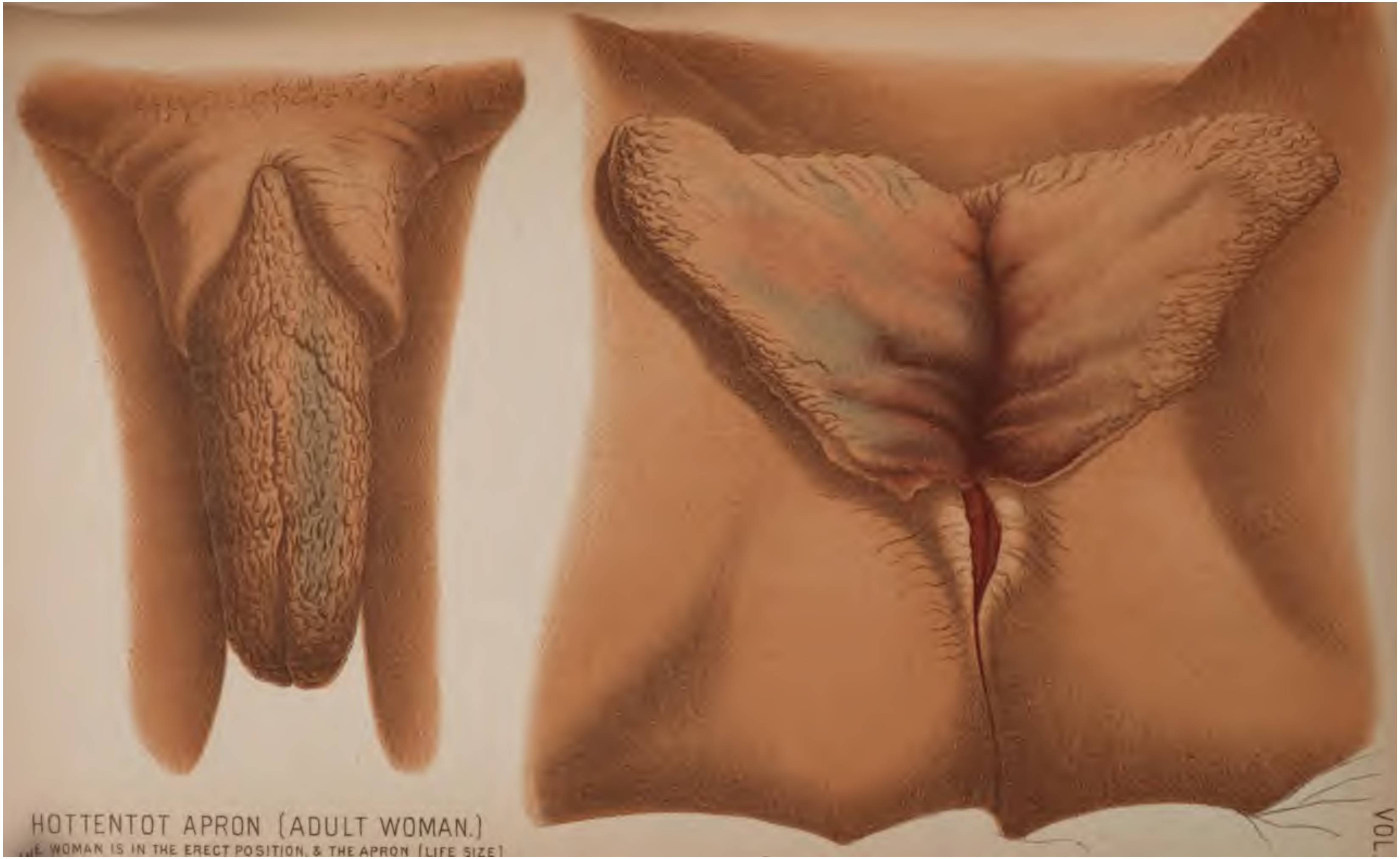
Cases of congenital absence of the labia minora, formerly called the water channels, have been observed, where the labia majora were normal (Mayer, Hartmann, Granville). Meckel has twice noted absence of the left labium minus without trace of cicatrix. Together with absence of the labia minora, is often associated absence or lack of development of the clitoris. Not a single instance of presence of the clitoris and absence of the other external organs has been recorded.

When the external genitals suffer from lack of development, they resemble naturally in size and appearance those of the infant, and we speak then of the vulva infantilis. The surgeon obviously can do nothing in these instances.

Cases of hypertrophy of the otherwise normal organs are frequent enough. Meissner states that there may exist even threefold labia majora, although such excess is more common in the nymphæ. Morgagni records an instance where there were four, and J. E. Neubauer one where there were six nymphæ.

Further still, such excess in development of the labia majora are recorded that they hung from the mons veneris to below the anus. Similarly the labia minora may be found developed so greatly as to spread over the labia majora, and hang down to the anal opening, so as to entirely cover the perineum. Halle has recorded an instance where the nymphæ completely covered the anus. More frequently, however, the labia minora are increased in size lengthwise, forming the so-called Hottentot apron. (See Plate.)

In premature fœtuses the nymphæ are normal in size. In the fœtus at term they are covered by the labia majora, and this is a sign that the fœtus is born at term. There are numerous variations, however. Later, that is to say, after a few months, and during the first years of the child's life, the labia majora have greatly increased in size from the deposition



HOTTENTOT APRON (ADULT WOMAN.)

HE WOMAN IS IN THE ERECT POSITION, & THE APRON (LIFE SIZE)

of fat, and they lie together covering all the other parts. Thus normally they remain throughout life. Still, in Europeans of various races, at puberty, the upper border of the nymphæ so often appear to a degree at the rima pudendi, that such a condition cannot be called pathological. This statement is not contradictory to that of Marie Vögtlin, that hypertrophy of the nymphæ is not in causal connection with the repeated irritation from frequent labors.

In old age, with the general disappearance of the adipose and the elasticity of the skin, the labia majora shrink into mere integumentary flaps, and no longer cover the nymphæ and the vestibule. The nymphæ then become again apparent, but in different shape and form from what they were in youth, for they too have withered with age.

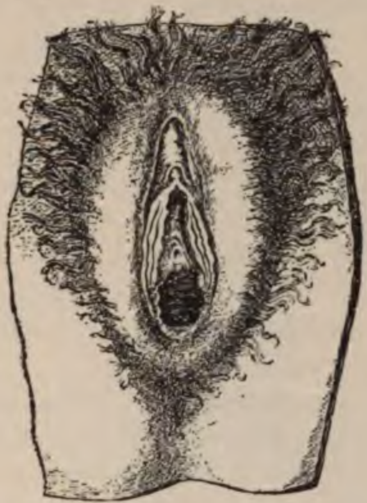


FIG. 38.—HYPERTROPHY OF THE LABIA MAJORA.

The nymphæ of all the external genitals have the greatest tendency to hypertrophy. They grow and spread outside of the rima pudendi, like the wings of a Zwank's pessary. Such enlargement is apparently a frequent affair in Turkish and Persian women, and occasionally requires amputation, as also in Coptic and Moorish women, about whom Strabo and Plinius wrote "nymphæ aliquando enormes sunt, quare Coptæ et Mauri circumcidunt." About the Hottentot and Buschmen so much has been written that we may take it for granted that hypertrophy of the labia is peculiar to all the women of the race. In them they grow to the extent of eight and nine inches long, and in the adult they hang like an apron over the external genitals.

According to Otto there are three explanations offered for this so-called apron: the first that it is due to great increase in the nymphæ; the second that it is caused by a swelling of the labia majora; the third that it is the result of the development of the muscles and the skin, hanging by a pedicle from the pubic bone, enclosing the clitoris and covering the rima pudendi. These suggestions of Otto's must, however, in the light of recent researches, be modified.

These researches, which are marked by the stamp of trustworthiness, and are markedly exact, are recorded in the *Bulletin de la Société Zoologique de France,* 1883. They consist of the account of the travels of Péron and Lesueur in 1805, and a critical and exhaustive study by Dr. Raphael Blanchard. It results from these papers that the reason why certain travelers have stated that they saw this hypertrophy, and others have denied its existence, is that women of different races were examined. It is not the Hottentot women, but the females of the Bushmen, who as a rule possess this apron, while the great majority of the former do not. The Bushmen are a race very different from the Hottentots and the Kaffirs. Very small and very wild, they are gradually being driven further and further away by the colonists, as also by the Hottentots and the Kaffirs. It would appear as though the Hottentot women had acquired the so-called apron through admixture with the Bushmen. From admixture with other races who possess a normal development of the genitalia, the Hottentot apron does not appear in the children. Contrary to the opinion of Otto and others, all authorities are now agreed, as the result of autopsies, and as certified by these French travelers, that the Hottentot apron is due to great hypertrophy of the nymphæ. A further peculiarity of these women is an immense deposit of fat in the nates (Fig. 39), as is represented in the well-known Hottentot Venus, and they show further peculiarities in the breasts. The labia majora are as a rule very small.

These anomalies appear early, so that even children possess the apron and the fat nates. In the male the deposit of fat does not occur. Since now the brain of the Bushmen is very small, the nasal bones very flat, the tibiæ flattened out (plactycnemic, that is to say, like the blade of a sword), these are all not only signs of a race of low development, but place them very near the apes, and therefore Blanchard draws the conclusion that the so-called Hottentot apron, the slight development of the labia majora, the deposit of fat on the nates, etc., must be ranked as atavism. To compare this race with the anthropoidal apes, in the female ourang-outang the labia majora are scarcely developed as also the mons veneris, while the clitoris is always large and its glands markedly projecting. The citoris is always split inferiorly. The labia minora in the chimpanzee are greatly developed, although less so in the other three kinds.

The majority of the above characters are alike in the females of the Buschmen and of the anthropomorphous apes, and hence Blanchard's conclusion seems allowable. We must also, however, lay stress on atavism, seeing that the Hottentot apron is seen in Europeans. In the year 1885, at the Erlangen clinic, we saw an individual with a so-called apron nearly as large as the one shown in Blanchard's drawing, although she presented no trace of atavism and was of German extraction

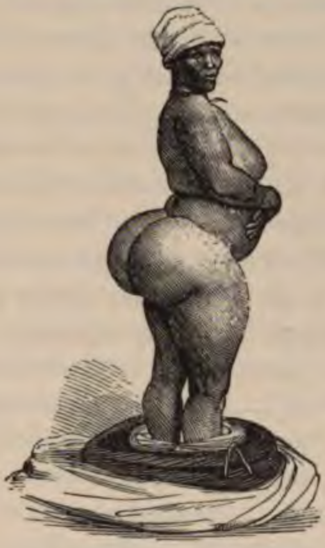


FIG 39.

Hyrtl records the fact that in certain barbaric African races, the enlarged clitoris—possibly this is simply Otto's third form—hangs like a sail over the external genitals; and as a guarantee of the virginity of the female, it is fastened by a ring to the perineum. We would be inclined to consider such barbarism as impossible, were it not for the fact that different travelers testify that on the upper Nile, and in the centre of Africa, it is the custom to freshen and to sew together the labia of young girls, in order to insure their virginity.

Hypertrophy of the nymphæ is met with among us as the result of disease. Meissner records six cases where the labia minora were very large and had become inflamed and tender, as the result of irritation in walking, riding, etc. Such patients were driven to seek surgical relief from their sufferings. Since in other works syphilis is referred to as a frequent cause of hypertrophy, it is allowable to suppose that condylomata have often been mistaken for simple hypertrophy. The history and careful examination ought always to make the differential diagnosis.

Hypertrophy of the Clitoris.—In little girls the clitoris is, as a rule, relatively large, and the older the child grows, the more it diminishes in size. In this respect there is a vast difference from the behavior of the corresponding organ in the male. The reason has already been given by Lisfranc. The corpora cavernosa clitoridis, which are inserted at the pubic angle, lie close together near the descending rami. When, at puberty, these spread further apart, the corpora cavernosa are drawn away from one another, and so the glans of the clitoris projects but slightly. We question if such a simple mechanical explanation will answer.

Hypertrophy of the clitoris even as of the nymphæ is met with more frequently in tropical countries. It has frequently been claimed that masturbation will cause the hypertrophy, but this is only exceptionally the case. In those countries where hypertrophy is frequent, it is often congenital, and circumcision is resorted to. Certainly we should rather look for the results of onanism in highly civilized people than in the children of nature, and since marked hypertrophy of the clitoris is rare in Europe, the opinion is general that it is the result of natural or onanistic sexual irritation.

In many of the recorded cases it is doubtful if there was hypertrophy, and not really a new growth of the organ. Meissner mentions cases of unquestionable hypertrophy recorded by Tulpius, de Graaf, P. Zachias, Avicenna, Plater, Rhodius, Panaroli, A. Severinus. At the Hamburg hospital Fricke extirpated a clitoris which was nearly as large as an erect penis; Armand found in a three year old child, in addition to great development of the mons veneris and the labia majora, a clitoris one inch long, and half an inch thick. Similarly a case has been recorded by Coste, where a woman of twenty-one had a clitoris the size of the penis of a fourteen year old boy. Ahlfeld records a number of cases of hypertrophy. The remaining cases of Meissner, on the other hand, do not concern hypertrophy, but new growths springing in part from the organ itself, and in part from the prepuce. Tumors fourteen inches long, or the size of a child's head, are not to be ranked among the hypertrophies.

When the clitoris is enlarged, but retains its normal shape, then may it imperfectly subserve the purpose of a penis as an agent of coition. In the older works are recorded instances, which prove that in immoral times it was not uncommon for females thus to have connection one with another. The name applied to this habit was "Lesbian love." Although in olden times the clitoris was so hypertrophied as to frequently serve for copulation, are we justified as physicians in believing that it may increase in size as the result of irritation? To-day hypertrophy of the clitoris is rarely met with in Europe, and yet two thousand years ago, it would seem to have been common. According to Parent-Duchatelet the clitoris in the prostitutes of Paris is usually, certainly in the majority, hypertrophied.

All the above-described hypertrophies of the labia majora, labia minora, and the clitoris, may be present without symptoms. Complaint is usually made on account of deviation of the stream of urine, or interference with intercourse. They may, however, through fusion of the labia, lead to concealment of the true sex. This is the explanation of the interesting case recorded by Casp. Baulieu, where a monk first became aware of his correct sex on the supervention of gravidity. There are many instances on record of irritation by the urine or the clothing, although such need not necessarily result any more than irritation of the glans penis does from the same causes.

In every case of great hypertrophy which causes symptoms, extirpation is the correct measure, and where such hypertrophy is noted in early childhood, the same procedure is indicated. It is apparent, however, from what we have stated, that resort to the knife is only necessary in the presence of great hypertrophy, seeing that in the slighter degrees there are not apt to be symptoms.

These anomalies, which as a rule affect more or less both the external and internal genitals, are to be sharply differentiated from those arising later in life, the result of fusion. As we have said, Foville's case may be explained on the supposition of such fusion having taken place. Here the genitals in the embryo have developed normally from the start, and later during intra- or extra-uterine life have become fused. The cause of fusion is the ulceration of two skin or mucous surfaces, which lie in contact. It is a surgical principle that two surfaces deprived of their epithelial layer will grow together. Where then wounds, abrasions, etc., have occurred, we need seek no further explanation for fusion.

We must next consider union the result of wounds or extensive abrasion during parturition. The so-called diphtheria of the vagina, gangrene of the mucous membrane, is a common cause and many instances of the kind are recorded. The cicatrization ordinarily affects the vagina, although exceptionally the labia are the site. (Cases of Seggel, Turnbull, Hastings, Hamilton, Kiwisch.) Two cases are on record where union followed on attacks of cholera. Hildebrandt mentions an instance where it occurred after small-pox. We propose, however, to leave entirely out of consideration instances of atresia vaginæ, seeing that they have been treated of by Breisky at length. A curious case, as regards its unique etiology, has been reported by Dr. Burdach. It concerns a three year old child who was left by her parents in a field, and while they were occupied with their work, the child fell on an ant-hill. The disturbed insects invaded the entire body of the infant, and many crawled into the genitals, and acted as such irritants that intense inflammation resulted. Medical aid was not sought until the labia and nymphæ had united. The child was ultimately cured by incision of the fused parts.

In the majority of instances of union between the external genitals of little girls, however, a very different explanation exists. Exactly as in boys, slight adhesion exists between the prepuce and the glans which ordinarily breaks loose spontaneously, so is the same condition frequently present in girls between the nymphæ. Bokai explains the occurrence on the assumption of arrested hornification of the superficial epithelial layer of the skin.

The superficial epithelium consists of flattened horny cells. There are a number of layers, and the entire thickness has received the name of the horny layer. Underneath the horny layer are the cells of the rete malpighi. It is apparent now that if the horny layer is arrested in development, the chances of fusion of the two surfaces are great. Hornification later on can lead to spontaneous separation of the surfaces, so that the [illegible] is only exceptionally lasting. Bokai noted thirty-nine instances of such union. In one little girl there existed retention of urine, on account of the adhesive process having extended above the meatus. Huebner believes that this epithelial adhesion may occur also in extra-uterine life. He found it in a girl nine months old. In the same category belong the two cases of Zimmer, one of five and the other of two years, also the case of Zeiss, and possibly that of P. Müller, where, notwithstanding apparently complete adhesion, conception ensued. A very similar instance is recorded by Kiwisch. We have seen one case of epithelial adhesion in a little girl a number of months old. She passed water readily, and on examination a small opening was detected anteriorly by which the urine escaped, but otherwise the genitals were adherent. A sound was passed through the above opening downwards, and on exerting considerable pressure the united skin flaps yielded without the slightest blood. I am also of the opinion that a similar adhesive process existed in a young girl who consulted me on account of absence of the vagina. There existed only a blind *cul-de-sac.* Since the young girl complained of dysmenorrhœa, we proceeded to open the vagina.

The first incision was made with the knife, and then the finger alone was sufficient to complete the canal. Specular examination revealed a mucous membrane slightly moist and covered with epithelium.

Epithelial adhesion of the external genitals occasionally gives rise to no symptoms during youth, and passes unperceived. Other children are affected on account of the deviation of the stream of urine upwards towards the abdomen, whereby it is extensively eroded and irritated. When the anomaly exists at puberty, symptoms from the side of menstruation supervene, and the girl is unfit for marriage. Then to the physical are added psychical symptoms. Conception is not absolutely impossible, as is probable from a number of recorded cases, and as is certain from Müller's case, where the woman became pregnant.

Where for one or another reason the clitoris is especially developed, (possibly from irritation by the upward projected stream of urine,) or where this organ is hypertrophied, then it may be a difficult matter to give an opinion in regard to the sex, especially when, as in Debout's case, there exists hernia of the ovary into the adherent labia, thus simulating the scrotum and a testicle. Debout's patient had from youth up played with girls, had mammæ and menstruated, but later on was pronounced to be a man on account of the clitoris, which was about three and a half inches long, and she was considered affected with hypospadias and to be cryptorchid. Later still, on separation of the adherent surfaces, she was proved to be a woman, since the internal genitals were found normal, and there existed only an enlarged clitoris with ovarian hernia. Eschricht reports a similar case.

The recognition of adhesions of this nature depends on careful sounding of the meatus urinarius, when the sound may be pushed backwards towards the anus and against the skin. When the sound thus entered, in case to one side of the united labia we find a body like the testicle, incision would be indicated in order to clear the diagnosis

The treatment, obviously, consists in free separation, and in taking steps to prevent reunion.

Very likely atresia of the hymen is not an anomaly of development. Breisky has already expressed it as his opinion, that even atresia of the vagina is rather to be explained on the supposition of the secondary obliteration of a previously formed canal than on that of an anomaly in development, due to the fact of insufficiency of formation. All the more probable is this the case in instances of impermeability of the hymen. The hymen is nothing else than the sharply projecting border of the lower extremity of the posterior vaginal wall, which forms, according to Dohrn, about the nineteenth week of the life of the embryo. The formation occurs, however, only after the union of the rectum and the genital furrow has taken place. The two opposed and fusing lamina must therefore have united before the recto-vaginal wall can have begun to form. The position is not tenable that a membranous layer can remain as such between the inwardly projecting genital furrow and the rectum growing up from below. Therefore it is that the expression imperforate hymen is not scientific, since it carries with it a false meaning. A non-committal term, like atresia of the hymen, or impermeability of the hymen, is preferable.

We have already seen how in the latter part of extra-uterine life, and in the early part of childhood, through defective hornification of the superficial epithelium, adhesions and more or less solid union may result. Breisky has even seen and described direct epithelial union as the cause of retro-hymeneal, thin, obstructing membrane, and we have ourselves witnessed an instance of atresia hymenalis in a young girl, where at the same time the entire vagina was affected by this epithelial adhesion.

It is probable then that both general atresia and that of the hymen are dependent on the same adhesive cause and secondary union, even as Bokai has proved is the case, in instances of atresia of the labia majora and nymphæ in the new-born. It follows then that such an atresia is likely to result in early youth, and that the condition may later rectify itself. If it does not the condition may result in retention of menstrual blood. The Indians are therefore not far wrong in their custom of never neglecting to test the permeability of the hymen by the insertion of the little finger.

The so-called double hymens are hence nothing more than partial median adhesion of the young epidermic cells. It is unnecessary to refer to the number of reported cases of atresia hymenalis, especially since Breisky has dwelt upon the subject at sufficient length.

Anus Vaginalis and Vestibularis.—We have already stated our opinion that complete absence of the external genitals, associated with normal development of the internal, had never to our knowledge been met with. Where the external genitals form, the genital furrow is always present. The anomalies in development result only from the fact that the canals formed from the genital furrow either do not differentiate correctly, or else that the vaginal walls do not develop sufficiently downwards. When one of the three canals of which we are speaking does not reach the genital furrow, it must end blind. Where the intestinal canal, for example, does not open freely externally, the child suffers from atresia ani.

It may happen now either that the anal opening, as we will for the present call the lower end of the genital furrow, lies near to the blind end of the intestinal canal, so that only a thin wall is to be overcome, or else the end of the intestinal canal opens into the uro-genital sinus, into the vagina, or into the bladder.

In other instances, where broad tissue layers intervene between the anal crease or anal opening, and the blind intestine, we cannot say that the two organs are undeveloped, but, on the contrary, when a trace of anal opening or of anal crease is present, we are only able to say that the end of the intestine did not reach the anal depression

When the extremity of the intestinal canal opens in the uro-genital sinus, in the vagina or in the bladder, we are dealing with defective development of the vaginal walls separating the canals.

Such defective development of one or of another vaginal wall is a remnant from the period of embryonic life. It is to be borne in mind that the allantois is a diverticulum from the embryonic rectum, and that from the outset communication exists between the two organs, embryonic rectum and bladder (allantois). Such is the condition up to the fifth week of fœtal life. Normally the rectum and the bladder then become separated. In the female, Müller's ducts spread between, so that in little girls opening of the rectum into the bladder is of very infrequent occurrence. If now the septum between the intestine and the bladder forms only incompletely below, then will the site of communication lie deeper, and yet the anus not be in its normal place. There results in the female an opening into the vagina, an anus vaginalis, and lower down an anus vulvaris or vestibularis, better termed anus uro-genitalis since the opening takes place into this sinus. Further still there occurs in the same sex an anus perinealis, where the anal opening is at the posterior commissure. In a reported case there was present between the posterior commissure and the anus an opening connected with a pouch three-quarters of an inch deep, which communicated above with the rectum. Defæcation occurred at times by the anus and then again by this opening in the perineum.

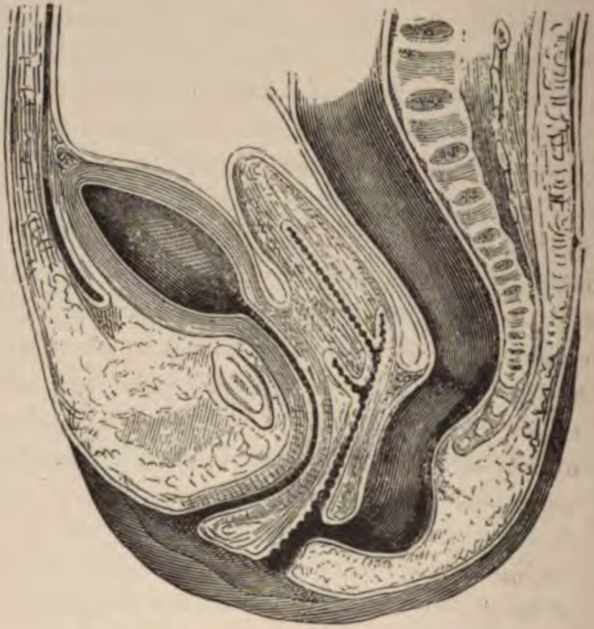


FIG. 40.—ATRESIA ANI VAGINALIS. (*Esmarch.*)

In case of all varieties of abnormal opening of the rectum, it is of prime importance to the individual, as to whether there exists a sphincter muscle or not. Kiwisch reports a case where a woman of twenty-six, affected with an anus vaginalis, was able to retain fæces, while, in contrast, a little girl of two had no retentive power whatsoever.

Since fissures of the abdominal wall have an influence on the external genitals, we must briefly discuss them here. The abdominal walls close concentrically at the umbilicus, by approaching one another laterally, and from above below, owing to incurvation of the embryo on its longitudinal axis. When traction exists at the umbilicus, the intestines are drawn out of the abdominal cavity, and closure of the abdominal wall becomes impossible. Opinions vary as to whether such traction is exerted on the omphalo-enteric duct, or on the urachus. The first view was originally advocated by Bartels and by Ahlfeld, as the result of many personal observations. On the other hand, Ruge and Fleischer claim that the causal factor is traction on the urachus. The important factor is lengthening of the urachus outwardly. We believe that both traction exerted on the omphalo-enteric duct and on the urachus are causal factors. The effect of outward lengthening is that closure of the abdominal walls downwards is prevented, as also union of the parts which lie in front of the allantois. A further cause is overfilling of the allantois and its displacement. The one is the natural sequence of the other, but the cause of the over-distension is purely hypothetical. It is possible that the starting-point lies in the lessened capability of distension of the prolapsed allantois, and that on this account the urinary cloacæ, that is to say, the cloacæ of the genital furrow, do not increase sufficiently in size, on account of the lessened pressure. There then results lack of development of the cloacæ, since the composite portions do not reach one another, and emptying of the intestinal and bladder contents cannot take place. Overfilling and prolapse of the allantois are the necessary consequences.

Further, the pelvic circumference may not unite, and there results a split pelvis, and also a split genital tubercle, and separation of all the organs developed from it: fissure of the clitoris, separation of the labia majora and minora.

The connection then between fissure of the abdominal wall and of the bladder, and absence of urethra with atresia of the anus and separation of the external genitals, is thus explained. We may also here mention the fact, although it does not belong to our subject, that through distension of the allantois, the union and fusion of the internal genitals is interfered with, since the distended allantois falls between Müller's ducts. Here lies the explanation of bifid uterus and vagina.

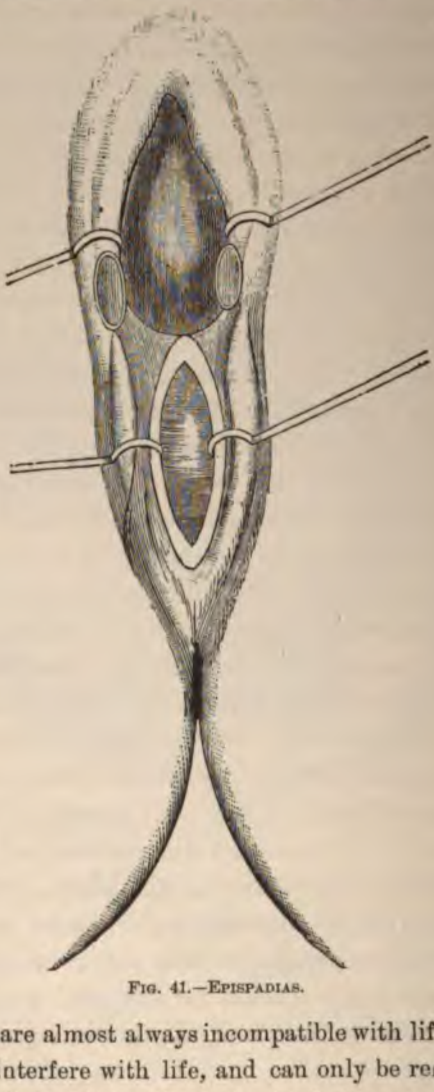


FIG. 41.—EPISPADIAS.

Large fissures are almost always incompatible with life. Smaller ones, however, do not interfere with life, and can only be remedied by plastic operations. Let it be distinctly understood, however, that not every fissure of the lower abdominal wall or of the pelvic region, is due to traction on the omphalo-enteric duct or on the urachus. Only those fall in this category which spring from the umbilicus downwards. All others, however, in which the defect is only below in the region of the bladder, and between which and the navel wide spaces of normal abdominal walls exist, can hardly be explained by traction exerted on the umbilical structures. Such cases occur, however, and to make clear my meaning, I refer to Kleinwächter's observation of so-called lower fissure of the bladder (fissura vesicæ inferior). Similar cases have been recorded by Winckel, Gosselin, Röser, Möricke, Frommel.

In case of superior bladder fissure, however, the above explanation holds, seeing that, as the result of traction, an approximation of the umbilicus and of the symphysis occurs.

Defect of the bladder in its lower portion has been long described as epispadias, and this term is an excellent one. Epispadias in the male refers to cleavage of the penis at its upper portion. The corresponding organ in the female is the clitoris. This organ, therefore, in epispadias must be fissured, and the fissure must extend into the upper wall of the urethra. Recorded cases prove occasional prolongation of the fissure into the bladder.

The prognosis of this affection has been much bettered, owing to the progress of plastic surgery. Röser's case and two from Schröder's clinic operated upon by Möricke and Frommel, were cured.

In Röser's case, a young girl of nineteen, troubled by incontinence of urine, had a fissure of the clitoris and of its prepuce. The halves were spread half an inch apart, and the nymphæ were also separated. The region immediately below the symphysis was covered with smooth mucous membrane, and there existed an opening, patent for the finger tip, which was bounded below by the posterior wall of the urethra. The anterior wall was lacking.

Analogous cases have been reported by Gosselin and Testelin. In the latter's case the defect in the bladder opened into a canal two and a half inches long, right underneath the clitoris, and one inch above the normal opening of the urethra, and urine flowed indifferently through either.

As explanatory of epispadias, the view held by Thiersch is the best, and applies equally to the female, although he enunciated it for the male. The uro-genital sinus is the anterior part of the genital furrow, and the posterior is the anus. In front the furrow is closed through fusion of the corpora cavernosa. For their union, however, the closure of

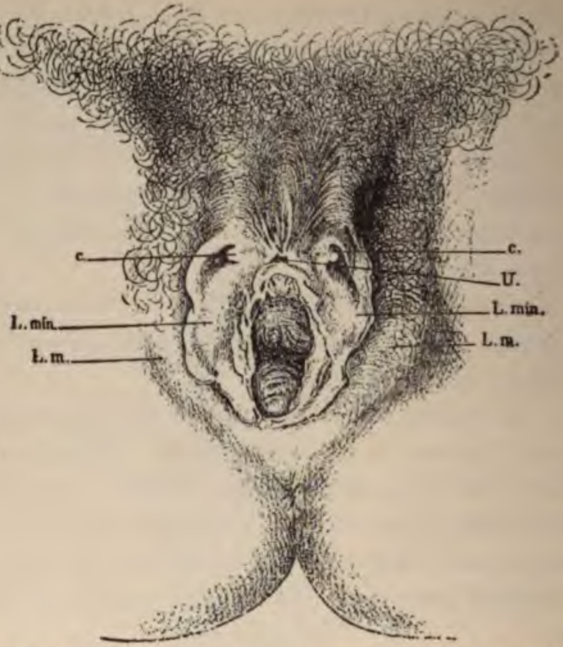


FIG. 42.--CASE OF FEMALE EPISPADIAS. (After *Frommel.*) *L.m*, labia majora; *L. min.*, labia minora; *c*, clitoris; *U*, urethra.

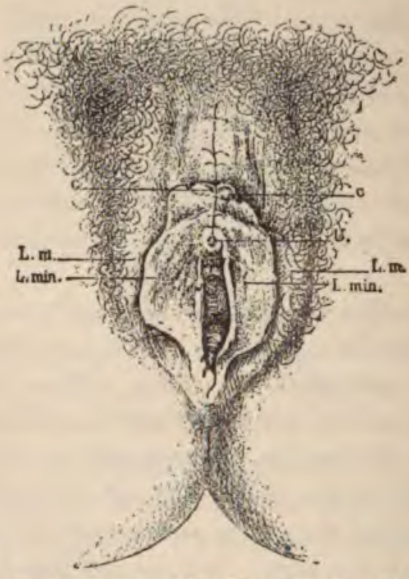


FIG. 43.—CASE OF FEMALE EPISPADIAS. (After *Frommel.*) *L.m.* labia majora; *L. min.*, labia minora; *c*, clitoris; *U*, urethra.

the pelvic circumference is necessary. Thiersch claims that ordinarily this anterior closure occurs before division of the genital furrow into sinus uro-genitalis and anus. As the result of early closure the sinus uro-genitalis is pulled forward, and thus a median septum is formed. In epispadias, however, the median septum is not formed, and the opening of the sinus uro-genitalis is so pulled forward that the corpora cavernosa do not unite and the anterior urethral wall is not developed.

Hypopasdias, or fissure of the urethra posteriorly, also occurs in the female. The posterior wall of the urethra is lacking, and the canal opens to a greater or less degree upwards in the vagina.

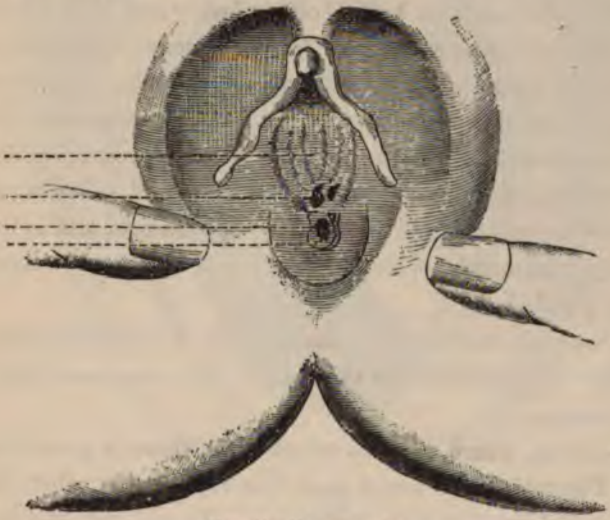


FIG. 44.—HYPOSPADIAS.

In case of hypospadias the external genitals are less associated in the defect. In particular we do not find union of the labia or fissure of the clitoris. On the contrary, in many of the reported cases the clitoris was enlarged, and herein we have a great help in the diagnosis of the sex. In the hypospadiac male there exists, in addition to the greater or less fissure of the corpora cavernosa, a lessened development of the penis and a backward incurvation. Hypospadias is likely to lead to error as regards sex, and it has often happened that male hypospadiacs have been considered female and brought up as such, even indeed married. On the other hand females, on account of the development of the clitoris, have been reared as boys. (Cases of Debout, Huguier, Jumé, Coste, Engel, Hildebrandt.)

In addition to cleavage of the clitoris as a consequence of epispadias, there are certain rare instances of fissure of the clitoris on record without epispadias which are very difficult to explain, for it is difficult to say what causes traction on the halves of the corpora cavernosa.

Hermaphroditism.—In these instances the sexual organs of the two sexes are combined in one individual. We already saw, when speaking of the development of the sexual organs, that in both sexes they originated from the same source. In short, every fœtus is, at the outset, a hermaphrodite, since it contains the essentials of the organs of both individuals, and it is apparently a matter of chance whether they will differentiate into the male or the female. And here there is a cardinal principle at stake. The fœtus contains both Wolffian bodies and Müller's ducts, and in the development into a male the former become epididymis and vesiculæ seminales, the latter atrophying, even as the latter become converted into female organs, in which event the former retrograde. It is, however, an open question, whether a double formation, so to speak, of both sexual glands may occur, even as happens in case of other organs of the body. It so happens in case of hermaphroditic animals, and in the embryo of the higher mammals Waldeyer has found this duplex formation of the genital glands.

Klebs has made the following classification of hermaphrodites:

1. *Bilateral,* where on both sides of the individual there exist testicles as well as ovaries.

2. *Unilateral,* where, at least on one side, there is present ovary and testicle. Theoretically it would seem that then on the other side one or the other sexual gland should be present. We will see that in the only reported instance of this nature such was not the case.

3. *Lateral,* is double formation of the sexual glands, where on one side a different gland, and therefore different sexual development, is apparent.

Of unilateral hermaphroditism there is not on record a single case. Bilateral hermaphroditism is very doubtful. We have to consider purely, therefore, instances of lateral hermaphroditism.

In all the hermaphrodites heretofore described, there was present the tendency towards development of one or another of the sexes. A simultaneous development of the Wolffian bodies and of Müller's ducts, and their accessories, has never as yet been met with. In the majority of herma-

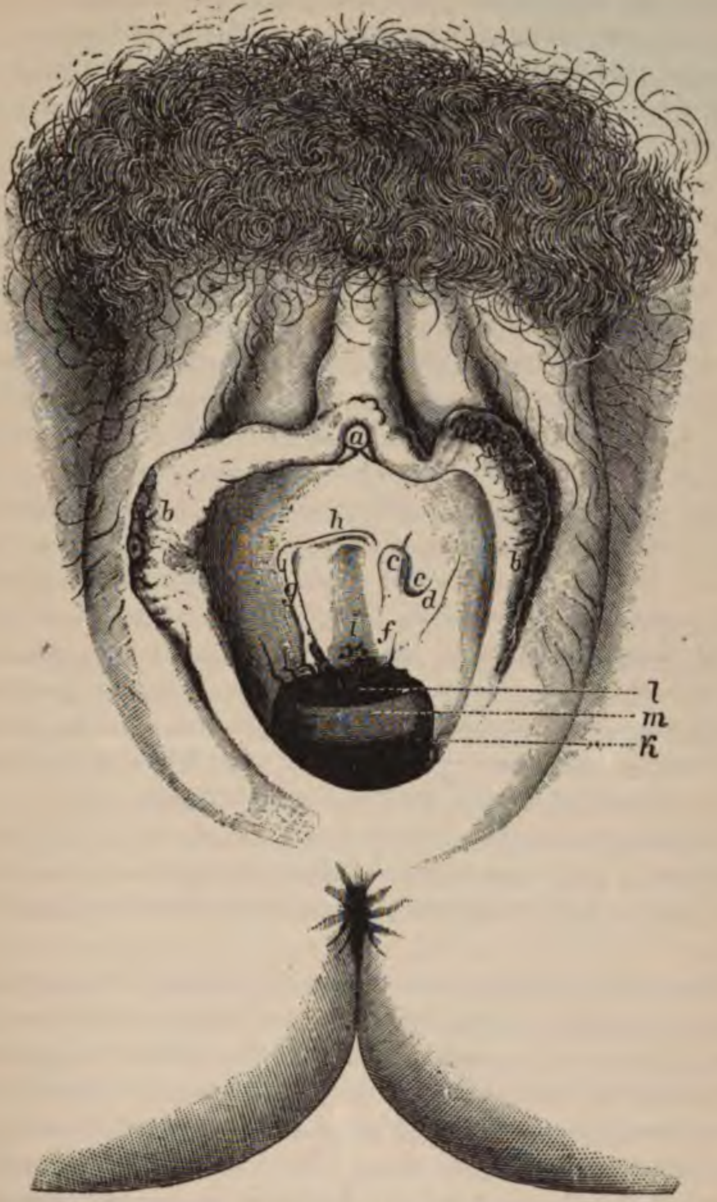


FIG. 45.—HYPOSPADIAS. *C*, clitoris; *b*, nymphæ; *c*, *d*, *e*, *f*, *g*, *h*, *i*, remnant of vesico-vaginal fissure; *l*, entrance into the bladder, *m*, posterior border of opening into bladder; *k*, vagina.

phrodites the tendency was unquestionably towards the male type. In most of the reported cases information is lacking as to whether one or another of the elements which go to form the internal genitals was in excess of the other, or if both were of tantamount importance. As a general truth it may be stated that one sex seems to have gained the upper hand over the other, although remaining in a state of development a trifle below the normal.

As to whether, now, the sexual glands themselves, testicles and ovaries, have the power of determining differentiation of sex, or not, can obviously only be determined by observation of hermaphrodites. The results of extirpation in early extra-uterine life point to the fact that from the sexual glands themselves emanates the stimulus necessary to the development of the other sexual organs, but early enough extirpation of these glands to settle this point definitively is out of the question.

That man is working in a vicious circle who, from the presence of uterus and vagina, predicates at once the bodies felt to either side as ovaries. He holds that as certain which as yet lacks proof. There are many instances on record where, from the presence of tube and a one-horned uterus, the conclusion has been drawn that an ovary also existed without subjecting it to careful microscopical examination. In those instances where such an examination was resorted to, never has an ovary with Graafian follicles and ova been found. The reverse is true of testicles, as the cases of Rudolph Stark and of Barlow prove.

For such reasons, then, Ahlfeld denies the existence of true hermaphroditism in the human race, and Dohrn is in perfect accord with him. As to whether such positiveness is warrantable or not it is impossible to say.

The truth is, certainly, that as yet no instance has been noted where two functionating and fully developed sexual glands existed in one individual. When all the genital organs bespeak a distinctive sex, and the whole individual bears the characteristics of a male, as in Meyer's and in Banon's cases, then it is certainly not to be expected that the other sexual gland is also normally developed, but we would rather be justified in the belief that the ovary had not developed, or else had retrograded. Such is the opinion forced upon us by the latest results of microscopical examination by Klebs in Meyer's case. In the organ claimed to be an ovary by Meyer, Klebs found cells which do not exist in testicles, and similar to primordial ova, and further still he detected cylinders or depressions suggestive of follicles. In the face of these findings, of course, no authority is entitled to absolutely deny the possibility of the existence of such cases. It is to be added, however, that the early structure of both testicles and ovaries are nearly similar, so that we should not lay overmuch stress on the certainty of anatomical differential diagnosis.

In the following brief *resumé* we will make use of Ahlfeld's and Klebs' recapitulation of the cases from the literature of foreign countries.

Of instances of true bilateral hermaphroditism, where, that is to say, on both sides there were present two sexual glands, Ahlfeld has reported two (Heppner's and Schnell's.) The description of the latter's case is too obscure to allow us to rank it with certainty in the category of true bilateral hermaphroditism. The internal genital organs were developed as in the female, but no microscopical examination of any of the organs was made. The case is very doubtful. True enough the external genitals were characteristic of the male, but it is not directly proved that a normal scrotum with testicle was present.

The second case, recorded by Heppner, of St. Petersburg, speaks more convincingly in favor of the presence on both sides of duplex organs. It was a child, two months old, with external genitals of the male type, but with imperforate penis. Externally it had a scrotum and a hypospadiac penis. Behind, into a long uro-genital sinus, opened a urethra and vagina; at their junction there was present around them a well-developed prostate. The uterus, tubes and ovaries were perfectly normal, and on each side an additional body which resembled a sexual gland. The parovarium—that is, the shrivelled Wolffian body—lay between the ovary and the second gland, the testicle, and was united to it. The appearance then was similar to that which holds in the normal development of the male sex. Heppner was the more convinced that this supernumerary organ was a testicle, because under the microscope he detected canals extending towards the hilus in increased size. The walls of the canals were lined with a structureless membrane, on which there appeared on the addition of acetic acid neither striæ nor nuclei. Vasa deferentia were not detected. Although Heppner came to the conclusion that the organ was a testicle, Slavjansky could not convince himself that it was not an ovary.

An instance of unilateral hermaphroditism,—that is, where on one side both the glands are present,—Ahlfeld says, does not exist, since Banon's case, described by Klebs, cannot be so considered.

Of lateral hermaphroditism there are a number of recorded instances: Sue, Maret, Varocler, Rudolphi, Stark, Barkow, Berthold, Banon, H. Meyer, Gruber, Klotz. We borrow Ahlfeld's description of these cases.

Sue's case concerned a fourteen year old child. Externally, a man, with hypospadias: internally, there were present on the right a tube with fimbriæ, an ovary, a round ligament; on the left, a testicle with two canals which were taken for vasa deferentia. In Maret's case, the individual was seventeen years of age, and externally a male with hypospadias. Internally the right tube, infundibulum and ovary were present, and to the left one testicle with vas deferens. The uterus was one and one half inches long. In Varocler's case, there existed hypospadias, and the age was eighteen. Internally, the right testicle with vas deferens opening in a normal receptaculum seminis; on the left, tube, ovary, round and broad ligament. The uterus was small and there was no vagina. Rudolphi wrote of a two to three months old child with hypospadias. In the right in a scrotum was a testicle with vas deferens opening into the uro-genital sinus. Internally was a uterus, and left tube, ovary, parovarium, broad and round ligaments.

Although in the above-cited cases the male sex was only recognizable by the external genitals, the question arises if such hermaphrodites possessed the capability of procreation. When Stark examined his case it was twenty-three years old, had seminal emissions and a decided propensity towards females. Death occurred in 1853 and Meyer described the *post-mortem* findings. Externally as regards the mammæ, hair and beard, the resemblance was to the male sex. The penis was 2½ inches long, when flaccid, and three inches when erect, and was hypospadiac. The perineum measured two inches. The uro-genital canal measured eight lines. There existed a prostate, and thence extended a vagina, three inches long, and ending in a blind pouch, above which was an equally long but more solid uterus. The tubes were permeable. To the right, at the extremity of the tube, was a testicle containing seminal ducts, and to the left was a body like an ovary but entirely covered by the peritoneum. As to whether this was the ovary or not remains highly in doubt.

In like manner were the conditions in Barkow's case, which lived to the age of fifty-four, and was a married man. The wife of this individual had borne a child in her youth. The *post-mortem* proved this individual to be incapable of procreation. The external genitals were hypospadiac. The prostate was traversed by a vagina; the uterus was herniated in the right scrotum. Near the uterus lay a testicle, but neither tube nor vas deferens. Below the testicle was an ovary, consisting, however, purely of cellular tissue, fat and blood-vessels, and containing no follicle.

Berthold made a *post-mortem* on a new-born child with hypospadiac penis. The scrotal halves were greatly wrinkled; the uro-genital cleft 1½ lines long. Externally, in the right scrotal half, a testicle with epididymis. Microscopical examination confirmed this. A vas deferens pursued a normal course to open into the uro-genital sinus. Internally there was a uterus unicornu, and on its right no trace of appendage; on its left, however, there existed tube, ovary, round ligament, etc. The ovary was lacking in follicles.

H. Meyer's observation concerned a small child. Externally there was an imperforate penis with hypospadias. In the left scrotum a testicle. The case was like Berthold's except that the conditions were reversed.

From careful microscopical research Klebs claims to have found cells, like primordial ova, and cylinders like follicles.

In Gruber's case the ovary was degenerated. Klotz's case is yet alive, so that nothing definite can be said about it. The same remark applies to the well known hermaphrodite Katarina, later Karl Hohmann. This case is in many respects similar to those described above, and has been pronounced a true hermaphrodite by the highest authorities. It has a well-developed hypospadiac penis; a testicle in the right scrotum; to the left many physicians have been able to feel a body which in size and form suggests the ovary, and from which proceeds a band which extends to a small organ behind the bladder, and which is considered the uterus. This organ opens by a small orifice into the bladder. The breasts are well developed; on the chin there is long hair, although no proper beard. The speech is deeper than in woman. There is a history of seminal emissions, and early in life of menstruation, although this is not certain. Ahlfeld considers this individual only hypospadiac, and we believe him to be right.

In considering the reported cases, it is apparent that the tendency in development is towards the male sex. And further, in all these individuals which attained maturity the sexual longings were directed towards the female sex.

As for the expression pseudo-hermaphrodite, it is not scientific. Where two sexual glands are not to be found in one individual, the word hermaphrodite is inapplicable. Of lack of development of the genitals we have already spoken under the head of epispadias and hypospadias.

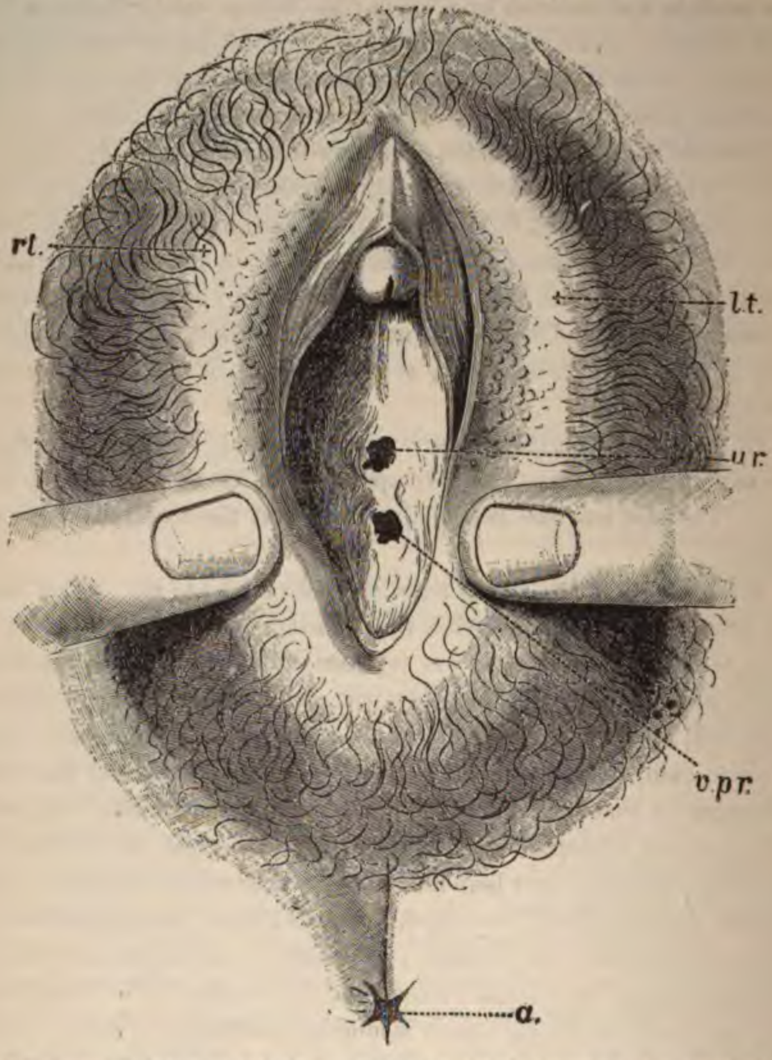


FIG. 46.—*ur*, urethra; *v. pr*, vesicula prostatica; *rt*, +, site of right testicle; *lt*, +, site of left testicle; *a*, anus.

We may further mention the fact that Müller's ducts may so develop in the male as to more and more obscure the sex of the individual, so that such a man may during his whole life be taken for a woman, and be married as such.

Uterus Masculinus.—In the female the vagina, uterus and tubes are formed by Müller's ducts. In the male these persist, normally, only as an insignificant remnant. This remnant consists in, above, a pediculated little vesicle, and below, a small *cul-de-sac,* the sinus prostaticus. This is the lower end of the obliterated Müller's ducts, extending from the opening of the ejaculatory duct to a greater or less distance into the prostate. These normally obliterated ducts, however, may persist and grow to a greater or less degree. The prostatic sinus may increase in size. This lower end of Müller's ducts corresponds to the vagina, and when it persists to a considerable degree in a male it might properly be called a vagina masculina. When the abnormal development is higher up, then we can speak of a uterus masculinus.

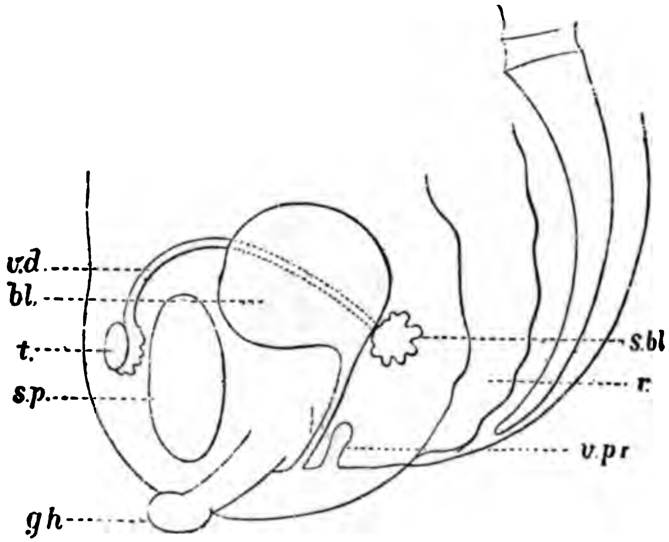


FIG. 47.—*bl*, bladder; *t*, testicle; *v,d*, vas deferens; *s. p*, symphysis pubis; *g, h*, genital tubercle; *s, bl*, vesicula seminalis; *r*, rectum; *v, pr*, vesicula prostatica. (Schematic of Fig. 46.)

We propose to sketch here the reported cases, with particular reference to the appearance of the external genitals.

Dohrn's published case bespeaks, generally, a female. The individual was brought up as, and was considered, a girl. When at the age of twenty, she began to suffer from a sensation of bearing down every four weeks, her mother sought medical aid. The physician told her that there existed no impediment to menstruation, but that if she wished to marry an incision would have to be made. The girl married and her husband shortly sent her to Dohrn for an examination, and he pronounced the individual a male. This case is all the more interesting in that the external genitals were of the female sex. There were two marked labia majora, made up of muscular fibres. At the upper end of each labium was a sensitive, round, soft, body, the size of a large pea, which could be pushed a trifle upward. A clitoris 1½ inches long, capable of erection, and like an infant's penis, was present. In the vestibule were two openings, the upper, a urethra, the lower led into a blind *cul-de-sac*, about ¾ of an inch in depth, which was the lower blending of Müller's ducts. By rectum no trace of vagina, uterus, or ovaries could be detected, nor, further, anything like a prostate. (Fig. 48.) The couple obtained a divorce.

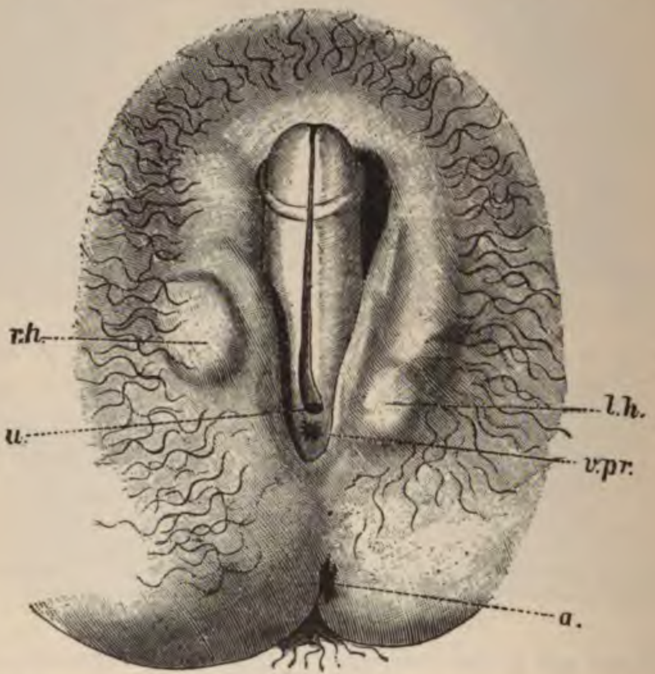
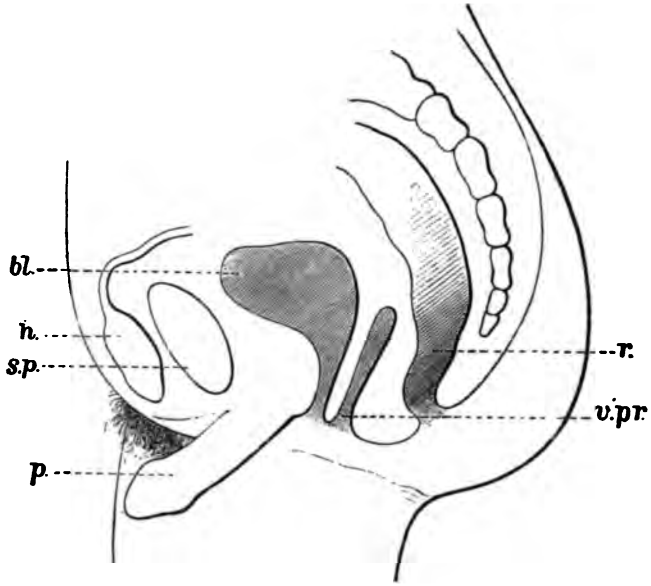


FIG. 48.—*r, h*, Right testicle; *l, h*, left testicle; *u*, urethra; *v, pr*, prostatic vesicle; *a*, anus.

Dohrn's second case belongs to a still higher grade of persistence of Müller's ducts, as also Leopold's case, which we figure. (Fig. 49.) Through the great, penis-like development of the genital tubercle, the differentiation from a female is made. The individual was brought up a female, but had the habits of a male, as also hair on the upper lip, cheeks and chin. The voice was that of the male, the *pomum adami* markedly projecting, the mammæ very flat. The external genital organs consisted of a penis 2¼ inches long. The glans and the under surface were cleft.



.FIG. 49.—*bl*, Bladder; *h*, testicle; *s*, *p*, symphysis; *p*, hypospadiac penis; *v*, *pr*, vesicula prostatica (vagina); *r*, rectum.

The anterior opening led into a bladder, the lower (vagina masculina) was blind. There was no scrotum, but two large, thick labia, in the side of each of which were organs which felt like testicles. The most remarkable thing, however, was that this individual stated that at the age of seventeen menstruation set in, and, although not profuse, recurred every four weeks up to the age of forty-six. Leopold pronounced this individual a male. To explain the menstruation, it is to be noted, that Klebs has stated that periodical hemorrhages not only may occur from well-formed male organs (Rayer), but especially in case of hypospadias, and in case of rudimentary sexual glands. This sufficed to lead Leopold to pronounce the case as one of male pseudo-hermaphroditism. Still the two sexual glands may have been herniated ovaries, and in addition there may have existed an arrested development of Müller's ducts; or else they were testicles, and the individual made false statements in regard to menstruation. Why this individual should have menstruated is certainly not apparent. That he had made other false statements was apparent from his history.

Leopold had previously recorded a similar case, where the individual at the age of twenty-five was married as a female. She had never menstruated. There existed simply a *cul-de-sac* instead of a vagina, the clitoris was small, and in general the appearance of the external genitals simulated that of the female. In the labia were two round, almond-shaped bodies. There is no *post-mortem* history.

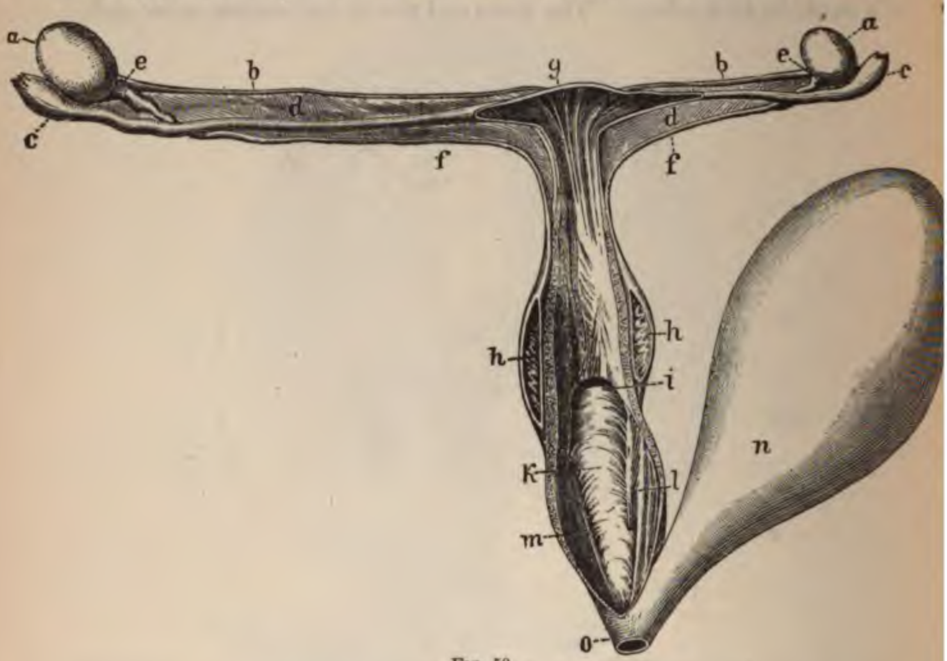


FIG. 50.

Veit records two similar cases of Oldham's where the malformation was due to herniated ovaries in individuals who had never menstruated. Leopold, finally, speaks of Ricco's, Steglehner's, and Giraud's cases. We will only mention here that Ricco's pseudo-hermaphrodite had never menstruated, that Steglehner's had simply menstrual molimina, and that in connection with Giraud's no reference is made to this function. Both of these latter were dissected and determined to be males, notwithstanding many suggestions of the female sex in their external appearances.

We now proceed to speak of those cases where not alone the vagina, but where from Müller's ducts had been formed a more or less rudimentary uterus masculinus. Here belong those instances where the uterus forms a cavity in the posterior bladder wall, or else both uterine cornua exist but the tubes are lacking, and finally where the male individual, although possessing testicles, has also complete development of Müller's ducts with tubes and fimbriæ.

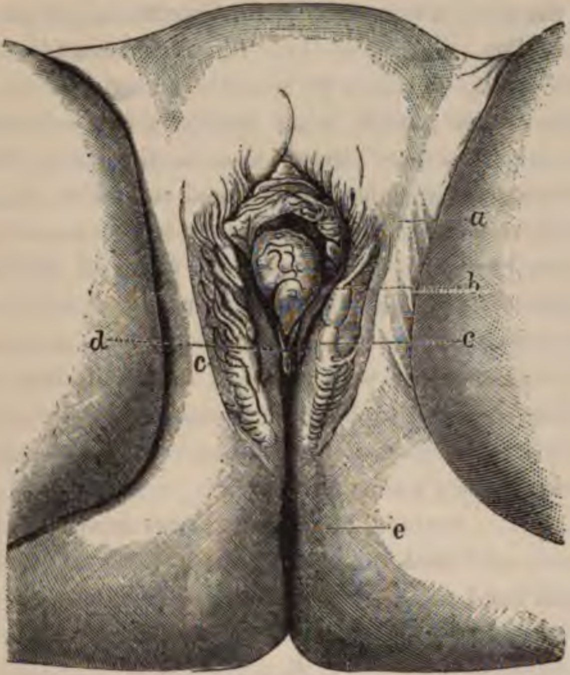


FIG. 51.

The figures 50 and 51 represent the genitals of a six months child which was considered a male because the genital glands were proved to be testicles, but still it possessed a vagina, uterus, and tubes.

The diagnosis of the sex is often very difficult, and yet of very great importance to the individual. In general, where there is ground for doubt, it is better to lean towards the male sex, since the various developmental anomalies in the male have always a special likeness to the female genitals. And again, examination *per rectum* by determining the presence of a prostate, an organ without an analogue in the female, will frequently settle the question.

The testicle and epidydimis in a cleft scrotum, suggestive of labia, increase the probability, of course, that the individual is a male. It is not to be forgotten, however, that hernia of the ovary in one of the labia, associated with impervious vestibule, may suggest a male although the individual is a female. A further important appearance is a vagina extending from the uro-genital sinus. We have already referred to this in adults. If the canal is very short (as in Dohrn's case) it should suggest a vagina masculina. Examination *per rectum* clears up the diagnosis, in case the internal genital organs are present, the vagina being usually very short and the internal genitals being directly in connection with it. In after-life the sexual tendency serves to clear the diagnosis. These pseudohermaphrodites, when they have been reared as females, often possess no special sexual leaning and allow themselves to be married to males, although themselves really of the same sex (cases of Dohrn, Leopold, Steglehner and others). Ejaculation of semen or typical menstruation are valuable factors in differential diagnosis. In not a single case, as yet, however, have spermatozoa been found in hermaphrodites, the ejaculations consisting simply of such a fluid as even females secrete on irritation of their sexual organs. We exclude, of course, all cases of hypospadias, where naturally a fructifying fluid is present.

The therapeutic measures applicable to these anomalies are naturally very restricted. All that surgery can aim at is the removal of defects, the opening of fused parts, and the closure of clefts by plastic measures.

In case of fusion, a sound is inserted into the canal which from its direction suggests the vagina, and the united parts separated by the knife. To prevent re-union it suffices to insert a piece of carbolized cotton between the separated layers. Before using the knife an endeavor should be made to cause disunion by means of the sound and thus to avoid hemorrhage. In case of labor we ought not to wait too long before interference. In many cases of union and atresia the simple force of the labor pains will suffice to effect separation, but it is better to make a slight incision in order to limit the extent of the resulting trauma.

Hypertrophied labia and enlarged clitoris are to be remedied by the knife or by the scissors. Hemorrhage is only profuse when the corpora cavernosa are wounded. The galvano-cautery had better not be used for removal; in case of hemorrhage the vessels need only be tied. For extirpation of the clitoris, the organ is seized in a forceps and drawn out. It is then separated on each side and finally from its base. Anesthesia is necessary, although the operation is short, since the organ is especially sensitive. After excision a simple suture is sufficient to secure union and to arrest hemorrhage.

In case of epispadias Röser operated as follows on his patient: He removed a crescentic piece from between the everted halves of the clitoris, the convexity of the denuded portion being forward, and extended the incision downward along the crura of the clitoris to meet in the mid line the centre of the meatus urinarius. The skin of the symphysis and the pubic rami between the margins of this incision was loosened as far upward as the meatus, and he then made a horizontal incision extending from the ends of the crescentic incision through the middle of the meatus, loosened the lower border of this horizontal incision, turned in the edges of the crescentic flap, and brought together, on each side, the urethral opening with the button suture. Thus then the lacking anterior urethral wall was made out of the mucous membrane of the symphysis and the patient's condition relieved, so that during the day urine was retained but at night there was dribbling. To relieve this the urethra was cauterized with nitrate of silver, and after three applications cure resulted.

In Testelin's case cauterization with caustic potassa caused closure of the canal which existed above the urethra.

In the case described by Möricke and operated upon by Schröder, a somewhat different operative course was pursued. An artificial canal was made extending underneath the symphysis. It would seem as though the urethra in this case was much shorter than in the other reported instances. The opening into the bladder was denuded laterally, and the flaps brought together from each side, above and forwards. There resulted a urethra about ½ inch long, and with retentive power. The left flaps retracted somewhat, and a number of operations were necessary before complete retention was possible.

In the two cases of Schröder, described by Frommel, the urethral defect was not so extensive. The anterior urethral wall only existed to the extent of about ¼ of an inch, but on the posterior wall (possibly prolapsed) there was sufficient tissue. Two right-angled incisions were made, the bases of which subserved the purpose of lengthening the urethra, while the apices met at the mons veneris. After suture one long side of each denuded portion formed the surface underneath the symphysis, and

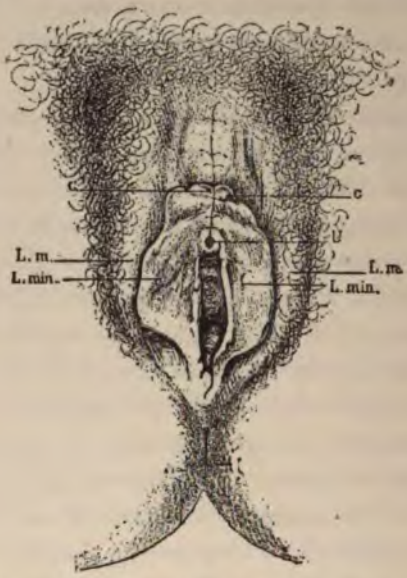


FIG. 52.—A CASE OF FEMALE EPISPADIAS. (After *Frommel.*) *L. m*, labia majora; *L. min*, labia minora; *c*. clitoris; *U*, urethra.

the external edges were united outside. The resulting urethra was over ¾ of an inch long and recovery was perfect.

CHAPTER III.

HERNIAS.

THE distinguished English surgeon Astley Cooper first called attention to the occurrence of hernia of the external female genitals, and Scarpa reported two personally observed cases.

Hernia of the intestines at the external genitals may occur in three localities:

1. The intestine descends through the inguinal ring into the labia majora. Scrotal hernia, then, has its analogue in inguino-labial hernia.

2. The intestine may either appear above or below the broad ligaments. In front of the ligaments they fall into the vesico-uterine pouch, between the bladder and the uterus, and below the lateral vaginal wall, extending, at times, to the labia. These are the vagino-labial hernias.

3. Below the broad ligaments, the intestines lie between the rectum and vagina, and result in vagino-labial hernias, similarly, by dissecting down between the rectum and the vagina. In the male the analogue is perineal hernia.

When in the last two instances intestine or omentum appears beneath the skin, necessarily the pelvic fascia and the muscles of the pelvic walls must have been loosened at one or another portion. In either case the peritoneum forms the sac.

Still other organs may lie in these hernial sacs. The occurrence of ovarian hernia at the inguinal ring is not at all uncommon. There is a vast difference, however, between inguinal ovarian hernia and labial ovarian. One case has been recorded by Billard, and we have already referred to Debout's case, as well as to an instance of utero-labial hernia seen by Barkow.

Inguino-labial hernias, analogous to scrotal in the male and occurring under similar conditions, occur less frequently than in the male, and are not so large. Still, instances have been recorded where the labium majus was distended down to the middle of the thigh. Since these hernias occupy rather the upper portion of the labia, they are called *herniæ labii majoris anterioris,* in contra-distinction to the vagino-labial, which are termed *herniæ labii majoris posterioris.*

Vagino-labial herniæ are very rare. Stoltz describes an instance in a woman six months pregnant with her third child. The right side of the vulva was enlarged, as also the inguinal ring. On cough the intestines descended. On repositing them, Stoltz was able to feel the opening between the fasciæ and the levator ani.

An interesting instance of this nature has recently been reported by Winckel, where the case was complicated by prolapse of an ovary. In connection with perineal hernia Hager's reported case is of interest on account of its size. The vertical diameter was sixteen inches, the transverse at the base was eight inches, and at the apex three inches. Another instance has been reported where a vagino-labial hernia was mistaken for a prolapse of the uterus, and was cut off, resulting in the woman's death.

As causes of these labial and perineal herniæ may be mentioned severe labors, great abdominal pressure, frequent and great distension of the bladder, tumors in the abdominal cavity, prolapse of the rectum and of the vagina.

The diagnosis is not difficult. There exists a tumor in the labia and the percussion note will be tympanitic. In Winckel's observation, however, such was not the case. Abscesses of Bartholin's glands, and various new growths must be differentiated. In the latter instance the percussion note is dull, and in the former the formation is painful and the skin over the abscess presents signs of inflammation. Certainty in diagnosis is, however, afforded by the fact that the hernia may be replaced and the hernial opening felt. Symptoms of strangulation have been noted, but impossibility of reduction has not. We cannot theoretically state how an operation for the relief of incarceration must be performed Treatment by trusses is indicated and is effectual in inguino-labial hernias, even as in other inguinal hernias. In cases of vagino-labial hernia pessaries are of assistance. Winckel endeavored to unite the edges of the hernial opening, but failed, and resorted to the bandage recommended by Scarpa. This consists of an abdominal bandage to which is attached a crescentic bar, at the extremity of which is a cushion. It is similar in appearance to Roser's uterine supporter.

CHAPTER IV.

INJURIES OF THE VULVA.

WE are concerned here purely with those injuries which occur independently of labor. Generally the injuries of the kind we refer to are exceptional, for the reason that the female external genitals are from their position protected from mechanical injury. Ordinarily wounds are the result of falls on some sharp object. An instance is recorded where the vagina was perforated by the penis. Injuries as the result of falls are common in women who in cleaning windows lose their balance. The hemorrhage may be profuse and consciousness be lost. In other instances the injury is done while climbing a fence, or from falling on lattice work. Where the corpora cavernosa are torn, the hemorrhage, although not necessarily profuse, is lasting. Deep suture and union of the lacerated parts will check the hemorrhage, a rapid recovery ensues, but the sutures must be passed deeply to prevent the formation of a hematoma and consecutive abscess, which might prove dangerous to life. Falls on sharp penetrating objects are, of course, still more serious. We recall a case where the vagina, perineum and recto-vaginal wall were penetrated. The woman was restored to health by the performance of a colpo-episio-perineorrhaphy.

As for the treatment of these severe injuries, it is according to general rules, and varies with the case. Injuries resulting from rape are rarely extensive. Usually there exist purely abrasions, which yield to the application of cold lead compresses, etc., within a few days after receipt of the injury.

CHAPTER V.

INFLAMMATIONS OF THE EXTERNAL GENITAL ORGANS.

INFLAMMATIONS of these parts are important from an etiological point of view, and according as their seat is on the mucous membrane or the external skin. Inflammation of the deeper part of the labia majora ordinarily arises from an affection of the glands of Bartholin.

Inflammation of the mucous membrane is catarrhal and may be either acute or chronic.

In the acute form the mucous membrane swells, becomes a deeper red and tender, and is covered by a slimy purulent secretion. The swelling and redness affect particularly the nymphæ. Chronic catarrh is rarer than in case of other mucous membrane, for the reason that here there occurs no retention of secretion.

Even in small children it is not uncommon for the smegma between the labia to remain, and, in case of lack of cleanliness and from irritation by the urine, this smegma degenerates and produces erythema, excoriations, intertrigo, which may eventuate in extensive and sub-acute inflammatory affections, and cause the child pain. In childhood the oxyuris vermicularis may progress from the rectum into the vagina, and produce at the outset pruritus, and then from frequent scratching excoriations and inflammatory processes. Rape only exceptionally sets up an acute inflammatory process, but although abrasions, redness, swelling and pain exist, there is no discharge.

The most frequent cause of acute catarrh of these regions is infection by gonorrheal virus.

An inflammatory process may also be present, although not catarrhal, when the external genitals are abraded from contact with the urine. The mucous membrane is similarly reddened, is excoriated, is covered superficially with flat, painful, nodules, and the sub-mucous tissue is densely infiltrated. A rarer cause than irritation from the urine is the result of discharge from necrosed cancer.

Inflammation of the external surface of the labia majora is very frequently met with, and, in general, is not of much consequence. The process begins in the crease between the thigh and the labium. The secretion here stagnates, and under the influence of moisture and warmth acts as an irritant. Movements and walking increase the pain and cause the affection to spread. The process affects in particular corpulent individuals. As a result of the inflammatory process the sebaceous follicles secrete profusely, and the discharge affects the parts adjoining the site of inception. Thus, in very corpulent women, the discharge may run down the thigh and the inflammatory process affect the lower limb. As the result of motion and attrition, the inner surface of the legs becomes excoriated, so that movement becomes painful, and such a dermatitis may be the cause of excessive pain.

Acute dermatitis, however, is also a sequela of typhus, and the acute exanthemata. The etiological cause is probably the same as we saw held above.

Corpulent women suffer greatly from these simple inflammatory processes, and in the vast majority we find the skin in these special localities greatly reddened and moist. Only through extreme cleanliness can this affection be cured.

Phlegmonous inflammation of the external genitals may result from the above-described catarrh and dermatitis. The source of abscesses of the external genitals is often to be sought in the pelvis, as for instance caries of the pelvic bones, parametritic and para-vaginal abscesses. Erysipelas may also affect the labia majora and pursue its customary course.

J. E. Atkinson has described a contagious form of vulvitis in children, where it would seem as though gonorrheal virus was the etiological cause. In a young girls' school where nineteen children from six to twelve years were educated, and who slept in one hall, six of the children were attacked almost simultaneously by edematous swelling of the labia, painful micturition, and purulent discharge from the genitals. These children were in the habit of sleeping together. The cause was supposed to be gonorrheal virus, because one year and a half previously there had occurred in the same school a contagious ophthalmia. R. Pott also believes that the frequent occurrence of vulvo-vaginitis in children is due to a specific, gonorrheal virus. Where a discharge persists for a long time the chances are it is specific. The virus is acquired from the older members of the family, through, possibly, unclean linen or bed-clothing. Pott is further inclined to think that a very persistent discharge is evidence of syphylis. Certainly, however, there exist forms of vulvo-vaginal catarrh which are not infectious, and which may, I believe, result from decomposition of the smegma, etc. I have myself seen this form in children where there was no suspicion of either syphilis or of gonorrhea.

Among the inflammatory affections we must refer to the formation of furuncles on the labia majora. These furuncles result from inflammation of the glands. Retention of secretion in the ducts lead to the formation of acne pustules and of small abscesses. According to Verneuil the sweat glands may also develop into large abscesses.

Finally there occur on the external surface of the labia majora all the various diseases of the skin, and in particular eczema of the skin over the mons veneris, giving rise to pruritus.

Under the term follicular vulvitis Huguier describes a special inflammatory affection which is characterized by the presence of little elevations, at the centre of each of which is a hair.

We must refer somewhat at length to gonorrheal vulvitis, since this is certainly caused by infection of the female with gonorrheal virus. For years it has been suspected that this disease was dependent on a specific virus, the gonorrheal, and to-day its specific nature has been proved to reside in Neisser's gonococcus. Donné's opinion that the cause of the infection is the presence of the trichomonas vaginalis has long since been rejected.

Gonorrheal inflammation varies in degree. Certain women are affected without special symptoms, others are seriously sick. We explain such variations to-day by the intensity of the virus associated with the greater or less receptivity of the individual. If the inflammatory process spreads from the vestibule, then the urethra is also affected and the patient complains of the characteristic burning on micturition. If the vagina is diseased then there is present a great amount of creamy discharge; if the uterus is the seat then we have an acute metritis. The most frequent site is, at least at the outset, the vulva, and then are superadded excoriations of the labia majora and of the nymphæ. In one instance which we saw, and where the source of the infection was clearly traceable, the papillæ were so enlarged that the mucous membrane resembled granulations. The woman complained of intense itching night and day, and I elicited from the husband the fact that he was suffering from gonorrhea.

In addition to the excoriations, the process extending through the lymphatics to the glands, there are present buboes, which, however, rarely turn into abscess. Further, boils and abscesses in the labia majora may be present. A vulvar catarrh of this nature is very prone to recur, and there is always a slight discharge and danger of renewed infection. The source of the slight discharge is generally to be sought in the duct of the gland of Bartholin.

The diagnosis of the different inflammatory affections is not at all difficult. All forms on the external surface of the genitals assume the appearance of analogous forms on other portions of the body. Virulent catarrh in the acute stage is so characteristic that it is recognized at a glance, and the form will often be differentiated by the history of burning micturition. If the inguinal glands are enlarged, which enlargement disappears soon after the cessation of the catarrh, then the diagnosis is certain.

The prognosis is in all these forms good. The inflammation, of course, as in other regions of the body, may become phlegmonous. Verneuil has reported an instance where a fatal affection followed on an abscess in the right labium majus. The patient was pregnant. The abscess was opened, and as the hemorrhage was profuse the cavity was packed with charpie. Miscarriage ensued, and sixteen days later death. *Post-mortem* an extension of the inflammatory process from the abscess cavity to the peritoneum was established.

As for the treatment, in acute cases in extensive inflammatory processes it consists in rest in bed. Leeches in vulvitis do no good, although they are useful in metritis. Cold compresses, cleanliness, as regards the external parts, and luke-warm injections, to which may be added disinfectants or narcotics for the vagina, such are the therapeutic indications.

The nitrate of silver, in solution of greater or less strength, has been much used. Since the discovery of the gonococcus, we ought from the standpoint of practical research, and theoretically as well, to resort above all to this agent, even though it has the disadvantage of staining the linen. In case of acute vulvar gonorrheal catarrh we should either paint the surfaces with a solution of nitrate of silver or else lay cloths dipped in the solution over the parts. The strength of the solution should be from two per cent. to ten per cent. Stronger solutions cauterize and smart, so that we can but rarely resort to them. Two per cent. solutions soothe the pain and are also deadly to the gonococci. All other astringents and disinfectants must yield place to the nitrate of silver. Before the application of the silver solution the external genitals must be washed or irrigated. If the vulvar catarrh tends to recur, then it is necessary to attack the duct of the Bartholinian gland. This may be injected through a fine needle with a two per cent. to five per cent. solution of nitrate of silver, but the procedure is a difficult one and uncertain. The same remark applies to the insertion of the point of lunar caustic. I prefer to take a knife similar to the one which ophthalmologists use for slitting the duct of the lachrymal gland, and inserting it into the Bartholinian duct to lay it open. Then we may use the silver solution to advantage.

In case of follicular vulvitis, treatment may be begun with a warm sitz-bath and then the parts are to be poulticed. The boils and abscesses are to be treated according to routine rules.

In the treatment of dermatitis cleanliness is of prime importance, and then a piece of cotton saturated in a five per cent. solution of tannin will speedily effect a cure. Other agents than tannin may of course be used, such as lead wash, or Goulard solution, etc. To-day it is no longer the custom to use ointments, as formerly was the rule.

In case of vulvo-vaginitis in children, the two per cent. nitrate of silver solution is again the best remedy. R. Pott has latterly recommended iodoform in the shape of pencils or suppositories, or else by insufflation through a speculum. If the hymen interferes with treatment it must be stretched with the little finger. J. Cheron recommends daily salt baths, laxatives, and injection of a dessertspoonful of the following solution in a half glass of luke-warm water, morning and evening. ℞ Glycerin ℥ iv., alum ust. gr. xlv., tr. opii. ʒ ss.

CHAPTER VI.

ŒDEMA AND GANGRENE OF THE VULVA.

ALTHOUGH edema during pregnancy and the puerperium is of frequent occurrence, aside from these conditions it is rare except as an accompaniment of general dropsy.

During pregnancy edema is ordinarily only an effect of mechanical congestion, and in the puerperium it is an early sign of local infection. As a result of mechanical interference with the circulation both labia, as a rule, enlarge, since the obstacle to the circulation lies above. In the puerperium it most frequently occurs to one side, and in the vestibule or in the vagina we find slight abrasions of the mucous membrane covered with an unhealthy deposit. Such an edema is therefore an accompaniment of wound infection, and only appears after infection is an established fact. This is why the swelling rarely appears before the third to the fourth day. I am inclined to lay great stress on this edema of the labia majora and minora, or as an indication of local infection calling for energetic local treatment. Further, when there exists an abscess in the vagina or its surroundings, swelling of the external genital organs is present.

As an index of ulceration, swelling of the labia minora in pregnancy is of value.

Aside from general dropsy, edema occurs, independently of the puerperium, as a consequence of furuncles, erosions, ulcerations from gonorrhea and cancer. Generally dropsy is caused by hydremia, disease of the kidney, lung and heart affections, etc.

Since the above affections are of long duration, we may speak of chronic general and local edema. The diseases accompanied by general dropsy eventuate in great swelling of the genitals; they hang like large sacs interfering with local examination and catheterization. The women are unable to approximate the thighs, and as a result of interference with the circulation gangrene may set in, which may lead to pyemia and end fatally.

Whenever the edematous skin breaks, the serum flows out, and the patients are relieved, but at the same time are liable to erysipelas, which frequently occurs after spontaneous or artificial opening of the edematous labia.

Gangrene of the external genitals ordinarily follows on the traumatism of labor. The compressed parts, deprived of proper circulation, are readily infected, and mortification speedily may follow. Puerperal fever, in a more or less outspoken form, frequently is accompanied by such gangrene. Ritzen witnessed a case of puerperal fever where gangrene of the labia nymphæ and clitoris was present. I myself saw in Strasburg a case where the labia sloughed, and cicatricial contraction of the introitus vaginæ resulted.

Aside from the puerperal state, gangrene, not the result of accidental causes, follows on the acute infectious diseases: typhus, measles, scarlet fever, small-pox.

In scrofulous, anemic children, spontaneous gangrene of the external genitals occurs, which is analogous to noma of the face. The acute infectious diseases have apparently here as well great weight in etiology, and gangrene of this type is often epidemic. It begins as a broad-based sero-purulent infiltration and erythematous redness of the genitals, resulting in mortification of the tissues, and the formation of blebs, on the bursting of which there remains a phagedenic ulcer.

Wood has reported an epidemic which he witnessed, and he shows how grave the prognosis is. Of twelve observed cases, ten died. Billard compares this noma with that of the mouth. Occasionally the initial symptoms are itching of the genitals and burning micturition. Again the symptoms are more intense, and general blood-poisoning and death follow rapidly on invasion of the genitals.

Heine has reported an instance where gangrene of the vulva led to the supposition of rape, although measles was present. The child was nine years old, but so apathetic that no information could be obtained. At the coroner's inquest the facts in the case were sifted and rape disapproved.

Phagedenic ulcers, the result of syphilis, spread widely on the surface but not in depth.

In the treatment of gangrene prophylaxis leads everything. Epidemic spreading from one child to another, during the course of an infectious disease, can certainly be prevented by recourse to antiseptic measures. The transmission of gangrene is only explainable on the assumption that poorly nourished children are directly affected through dirt or transference of septic matter to an abraded surface. Cleanliness, disinfection, such are the measures to be resorted to for the prevention of spreading.

Yellow and black wash, camphor, etc., are to be applied on compresses. A clear indication is to tone up the system.

The treatment of edema is merged in that of the diseases which cause it. In case of general dropsy the aim is to prevent the occurrence of gangrene and of erysipelas. Edema during pregnancy may best be treated by posture, and in case of pendulous abdomen by the wearing of an abdominal binder. We should beware of puncture by lancet or needle, since erysipelas quickly develops. Where blebs have formed it is good practice, however, to give exit to the serum. Possibly puncture under antiseptic precautions, and under the use of iodoform, etc., are not so likely to be followed by erysipelas.

CHAPTER VII.

EXANTHEMATA OF THE VULVA.

ERYSIPELAS OF THE VULVA.

THE researches of recent years justify us in ranking this disease among the acute infections. When the disease invades the system, it does not enter through the uninjured skin or mucous membrane, but we always seek for some entrance site for the infection. In the new-born this site is at the umbilicus or the eroded nates, genitals, etc. Both general and local erysipelas are highly dangerous, in the latter instance not so much on account of the affection of the genitals as from the accompaniment of peritonitis and septicemia.

Prophylaxis is here again the chief factor in treatment. The umbilical site should be carefully watched after fall of the cord; the site should be kept aseptic by sprinkling with [illegible] when the surface does not heal quickly or the child is weak. The same rules are applicable to superficial abrasions of the skin. Where the wound-surface is deep it should be sprinkled with iodoform. In childhood the disease affects scrofulous and anemic children. In these the infection site is to be sought at the eroded genital region. At puberty and after, erysipelas of the genitals appears at the time of menstruation, to disappear with the menstrual flow, and to reappear at the next period. The affection is characterized by burning and itching of these regions and with fever. Here the process is similar to what has been said of [illegible] facial erysipelas; there are pauses of [illegible] with [illegible] at each [illegible] period there comes recurrence.

Finally erysipelas may proceed from the macerated and eroded labia. In the puerperium, which we have [illegible], there is superadded erysipelas.

The treatment is similar to that [illegible] as elsewhere. Although when the disease is [illegible]. The methods most used are powdering the [illegible] with [illegible] or starch and flowers of sulphur, etc. The use of oil, fat, vaseline, relieves the burning sensations. For a number of years Hüter's method of the sub-cutaneous injection of carbolic has yielded good results, although it is questionable if the method be not rather of value to abort the affection than of utility when it has developed. At the beginning Hüter recommends the injection of one to two syringesful of a two per cent. solution, and later of a three per cent. The injections are made in a number of places into the healthy skin around the eryispelas patches. Böckel, who has often used the method, and considers it relatively as the best at our disposal, injects at the beginning of the affection, twice daily, five to six syringesful of a five per cent. solution, about ¼ of an inch from the infected zone.

The rubbing with turpentine, advocated by Lücke, is also to be used in case of erysipelas of the external genitals.

Eczema.—The chronic form usually affects the female external genital organs. In the male organs we also see the acute form, and the eruption with the burning sensation appears so quickly that frequently in a few hours the disease is in full force. The first symptom is intense burning of the labia, followed by redness and swelling, and the appearance of small vesicles the size of the head of a pin. These vesicles contain a clear fluid, and are best seen by side illumination. When the vesicles break, there remains a moist excoriated site, over which, through drying of the exudation, there forms a scab. Generally the physician sees the disease in this stage. Slight fever and gastric disturbance accompany the acute form, and after three to four days the redness, swelling, and pain disappear and the scab forms. The acute form yields to treatment in from one to two weeks, but in order that this may happen the eruption must not be interfered with by rubbing or scratching. In the chronic form the disease may spread extensively over the mons veneris on to the abdominal wall, and downward along the thighs. On account of the swelling of the labia the rima pudendi is wide open, and there is present a purulent vaginal discharge. Hence, since the nymphæ are also swollen and sensitive, the presence of gonorrhea is suggested, if we have not seen the disease at its inception. The chronic eczema is often the overlooked cause of a pruritus vulvæ. Hebra says that in the majority of instances eczema is an accompaniment of menstrual disorders, (sixty-two times out of 101 affected women). Since the same thing has been remarked in case of herpes of the vulva (Lagneau) it would seem as though the two affections were often mistaken the one for the other. Diabetes mellitus is often the cause of eczema of the skin of the thighs and of the external genitals.

The differential diagnosis must be made from herpes of the vulva. Both these forms further may be mistaken, in the stage of extensive ulceration, for syphilitic ulceration. Legendre has reported an interesting medico-legal case of the kind. The course of the disease evidently clears up the diagnosis.

Between eczema and herpes the diagnosis, in general, may be made in that in the first instance there is diffuse spreading, and in the latter an eruption in groups; in the former, further, the underlying tissues are more affected and infiltrated, while in the latter they are sound.

The prognosis, if the treatment be prompt and thorough, and if rubbing and scratching be not resorted to, is good. Still there are aggravated forms, especially on the mons veneris, which are difficult to treat. The most unpleasant symptom is the itching, which disturbs the patient both night and day. In the acute stage, during the burning and the swelling, the patients themselves ask for cold applications. The French physicians much prefer warm poultices. In general cold-water compresses relieve the symptoms best, but the water should be soft, rain water or boiled and filtered. To soften and remove the crusts, the different oils are of service, pure, with carbolic one part to eight, or else zinc oxide ointment made after Wilson's formula (oxide of zinc, tincture of benzoin, glycerine, lard, ol. amygdal. āā ʒ ii., gr. xxx.), or else Bell's calomel ointment (calomel ʒ ii., lard ℥ j.). Against the moisture the parts may be powdered with starch, or starch and sulphur. When the parts are less moist, Hebra recommends the diachylon ointment, and similarly white precipitate ointment, etc., are useful.

Where we wish to cauterize slightly, borax solution (1 to 12) or the zinc oxide with acetic acid (1 to 100) answer the purpose. The lime solutions and soaps are useful for removing the crusts. Preparations of tar, according to Hebra, may give rise to itching and excessive moisture, so that they should be tried carefully. On harder surfaces, like the labia, they are not specially effective. Latterly iodoform has been recommended in case of eczema vulvæ.

Herpes Vulvæ.—This affection is characterized by the appearance of little vesicles, with clear contents in groups. We have already referred to the differential diagnosis between eczema and herpes.

Corpulent women whose labia hang down deeply between the thighs, and where there is much secretion, are peculiarly liable to this affection. Possibly there is some causal connection between it and menstruation, since it is most likely to appear one to two days before the periods. There may be one or more groups of vesicles which burst and leave a superficial erosion. These remain till after menstruation and then disappear in a few days without leaving any trace. Pregnancy is a period when the disease is likely to appear owing to the tendency towards congestion. Vaginal discharge, unclean linen, rubbing and scratching by dirty drawers, immoderate coitus, such are other predisposing factors. A case of Legendre's would seem to prove that contact with blennorrheal discharge may give rise to herpes.

Herpes is accompanied by less redness and burning, in general, than acute eczema. The burning is found rather on the inner surface of the labia majora.

The course of the affection is typical. In about seven or eight days the vesicles disappear, dry up, or appear at another portion of the surface. Deep excoriations may form as the result of scratching and of rubbing. The appearance of the eruption worries those affected exceedingly. From syphilitic erosions and ulcerations herpes is differentiated by the border, which is not very round, by the intense itching, and by the deep red color instead of the coppery discoloration of syphilitic sores.

The treatment is to be directed in particular against the pruritus, lest the natural progress of the affection be disturbed. If the herpes is only present as one to two groups of vesicles, the simplest remedies are sufficient for cure—rest of the parts and frequent washing with warm or cold water. When painful ulceration is present, then our measures should be: rest in bed, warm baths prolonged for one hour, poultices, cold drinks, light diet. In case of vaginal catarrh luke-warm injections should be ordered. Thus in five to six days the patches will be healed.

In those exceptional instances where the eruption is in the introitus vaginæ or in the anal crease, and where in consequence it is not possible to poultice, the French physicians are in the habit of touching the vesicles with a solution or the solid stick of nitrate of silver. Hebra, however, is opposed to the use of this agent as well as to that of cold compresses, even though patients ask for them for the relief of the burning, since the compresses cause maceration of the vesicles, and the corium is entirely laid bare. He is in favor of the dry treatment and powdering with starch.

Prurigo.—The characteristic of this affection is intense itching and the formation of little papules of the same color as the skin or else a trifle redder. The name has been wrongly applied to cases where there existed no alteration of the skin but only itching, and a variety has been made of those cases where there is pruritus from the presence of body lice, but when the characteristic papules are not to be seen the term prurigo is not applicable. The etiology is not known. We can only say that this disease of the skin is most frequently met with in poorly nourished young persons. Hebra states that prurigo is not curable. There exists a very small drop of fluid under a relatively thick epidermal layer. According to Klebs there are present in the swollen papillæ ectasic lymph-vessels, by which the sensitive nerves of the skin are irritated. From the presence of these papules the skin has the appearance and feel of goose-flesh.

The disease has absolutely nothing to do with syphilis. As the result of examination of sections Klob found "an enormous increase in the cells, even as in case of tubercle, as the basis of the formation of the papules."

The prognosis as regards health is very poor. The treatment can only aim at relieving the itching, and this will be accomplished by any means which will secure speedy removal of the epidermis, such as baths, soap, ointments, etc. Whatever is used must be employed energetically and for a long time. We must mention in particular the use of preparations of tar. The diseased portions must be rubbed with tar or with Wilkinson's ointment, and then the patient should be placed in a bath and remain there for hours. Wilkinson's salve, according to Hebra, consists of, Flores sulph., olei cadini, āā ℥ vi., saponis viridis, axungiæ porci, āā ℥ xvi. cretæ ℥ iv.

Diphtheria of the Vulva.—When the surface of the mucous tears at the ostium vaginæ, which occur during labor become covered with a grayish deposit, they are known as puerperal ulcers, and when the deposit spreads the name diphtheria is applied. Beyond this quantitative explanation of the difference no one has ventured. No one has as yet claimed that this diphtheria is specifically contagious, as is true diphtheria. It has never as yet been noted that such a diphtheria of the vagina and vulva can produce a case of pharyngeal diphtheria. Since new gangrenous patches may become covered with a similar gray deposit it is clear that the name diphtheria is wrongfully applied. We are simply dealing with gangrene of the mucous membrane, the result of traumatism during labor, and during the puerperium the disposition to wound-infection is great, seeing that there is no absence of septic germs. It is not surprising that as a result of this diphtheria of the vulva there should be present large ulcerated surfaces, and that after the healing process cicatricial contraction of the vagina should ensue. On the other hand, during epidemics of pharyngeal diphtheria, the coexistence of the same disease on the vulva has often been noted, and here no one will deny the probability of direct extension of the contagion. Here, however, the vulvar diphtheria is purely an unfortunate accompaniment, and the danger does not lie in it, but in the original seat of the disease.

CHAPTER VIII.

FUNGOUS GROWTHS AND PARASITES OF THE VULVA.

WE will first speak of the animal parasites, which are few in number, and which, with the exception of the harmless trichomonas, come from the rectum. The most common parasite is the oxyuris vermicularis. There is certainly no obstacle in the way of the wanderings of this ascaris from the rectum into the vagina, since it may progress along the perineum. They are found most frequently in little girls. In addition to the ascarides the eggs of the tænia solium and the ascaris lumbricoides have been found in the vulva, the result of uncleanly habits in wiping the anus after defecation. We are not in a position to state whether the eggs of these parasites may be retained in the vulva and the vagina and eventually there be developed. In case of the ascarides this is claimed by Vix.

The pediculus pubis is only found in the hair of the pudenda and of the mons veneris, and causes itching and scratching. During coition the acarus scabiei may be carried into the vagina. Haussmann in one instance found the mites of this species in the vaginal mucous, although they were dead.

The vegetable parasites are scarcely of less importance. We will not refer here to vibrios and bacteria. These are so frequent, especially during the puerperium, that it is no matter for surprise that they are found constantly. Of the vegetable parasites only a few are noted: the leptothrix vaginalis, the oidium albicans of Robin. Leptothrix was first found by Leuwenhœck, but this had been forgotten until Donné again called attention to it, and Kölliker and Scanzoni as well. In addition, C. Mayer, E. Martin, Frankenhaüser, and Winckel detected this fungus in the female genital organs.

These fungi are harmless. With the exception of transient burning in the genitals they cause neither symptoms nor disease. The burning appears ten days after deposition of the fungus, and in a further similar period disappears.

The oidium albicans, according to Haussmann, causes a little extra burning, and there is also elevation of temperature. In one case it was found in a gravida; pregnancy indeed would seem to predispose to this fungous growth. Diabetes has a marked influence. According to Friedreich the cause of the pruritus which accompanies diabetes is the presence of this fungus. We saw one instance where, in the presence of grape sugar, the oidium developed into threads. Further still, I have seen the development of this fungus in a woman not gravid, and in the absence of diabetes; and here I would refer to certain experiments which I made in 1877 with Dr. Rees, the professor of botany.

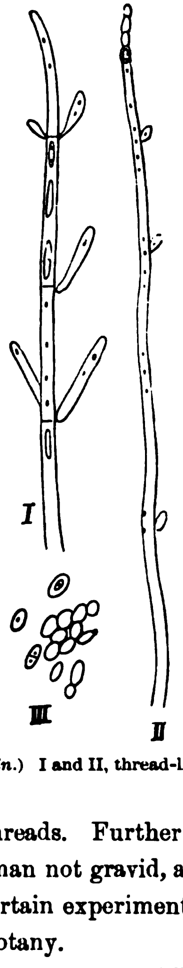


FIG. 53.—OIDIUM ALBICANS. (*Robin.*) I and II, thread-like forms of the growth; III, yeast-like vegetation-form of the oidium.

Thrush deposit from the mouth of a child was placed in cherry-juice, and there developed germs similar to that of the yeast plant. Control experiments proved that the yeast germs from the mouth also developed into threads, and so the two forms were similar except in their development sites. In both instances we were likely enough dealing with spores. The thrush was further afterwards subjected to the customary treatment with borax and honey. The control experiments in the mouths of adults, and in particular of dogs, were negative except when the salivary glands had been removed from the dogs. Usually also attempts at implantation on the vulvar mucous membrane were negative. Only once did a slight layer of the fungus appear, and this vanished spontaneously in a short time.

The treatment of this parasite is simple. Injections of weak metallic solutions, cupric sulphate, sulphate of zinc, will cause its speedy disappearance. Latterly two per cent. solutions of carbolic have been recommended by Conrad and Haussmann, and solutions of borax or hypermanganate of potass by Mettenheimer.

Finally, we must mention that harmless parasite the trichomonas vaginalis. This is a mass of protoplasm with one or two vibratile ciliæ. It is of no pathological importance, and will disappear on attention to cleanliness and on the use of injections.

CHAPTER IX.

LUPUS OF THE VULVA.

LUPUS is considered by Virchow to belong among the granulation tumors. It is characterized by the appearance of nodules which by confluence cause a diffuse swelling of the skin (lupus hypertrophicus). The site of inception of the disease becomes indurated and sinks between the larger or smaller nodules to form fissures. The more tender the underlying tissue, the greater the tendency of the tumors to grow downward and to undermine the integument (lupus perforans). In other places, particularly on the mons veneris, the disease tends to spread widely. It usually then creeps along one side while on the other cicatrization is beginning. (Lupus exedens or exulcerans.) Eventually the disease, here and there cicatrized, creeps over the entire vestibule. (Lupus serpiginosus.)

The disease is rare. First described in 1849, by Guibourt and Huguier, as a chronic ulcerated disease of the skin, a few instances have been recorded by Martin, Lorent, Veit, Matthews Duncan, Martineau and Winckel. The disease occurs usually between the ages of twenty to thirty.

Bernutz and Guèrin distinguish lupus into the three varieties which we have noted above: 1. Superficial inflammation, serpiginous in character, subdivided into the erythematous and the tubercular form, and including the exedens (exulcerans) form. 2. Lupus perforans. 3. Lupus hypertrophicus, with the subdivisions, the erythematous and the ulcerous. Martineau accepts for the vulva only the two forms or periods, the erythematous and the ulcerous.

On all portions of the genitals which have the structure of the external skin, there appears a dull red, livid blue discoloration, associated with marked infiltration and hyperplasia of the skin. There appear, in some instances, flattened light yellow nodules, the size of a pigeon's egg, the internal surfaces of which appear like superficial granulating tumors. The surface is smooth, tense and shiny. On the surface of reddish blue masses appear deep red points the size of a lentil. At the same time there are marked projections which Martineau claims are simply tubercles.

These changes are ordinarily painless, and therefore this period of the disease may not be seen by the physician, for aside from disfiguration of the genitals the disease thus far does not inconvenience the patient.

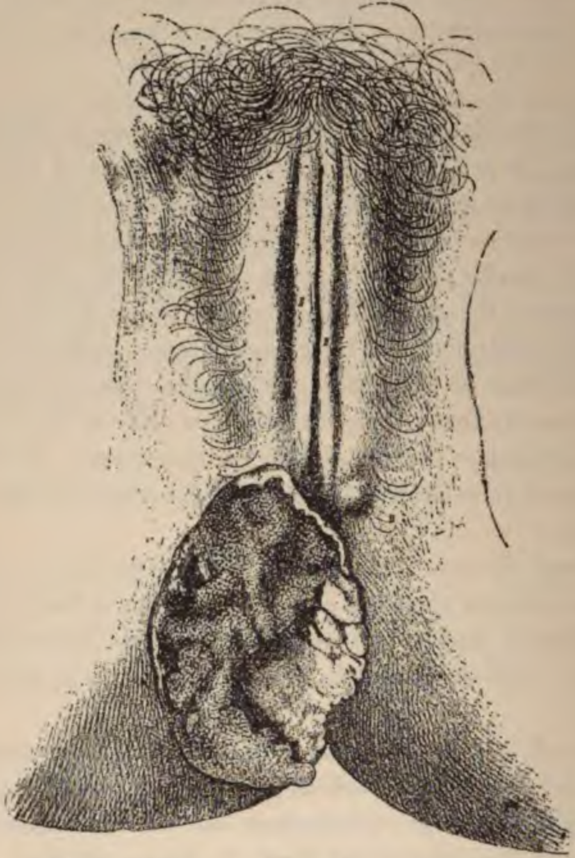


FIG. 54.—LUPUS HYPERTROPHICUS OF THE VULVA, PERINEUM AND ANUS. (After *Huguier*.)

In more advanced stages the tubercles tend to soften at the centre, and when this is scratched or injured a little abscess forms. The second period is one of ulceration. The nodules coalesce, in the form of irregular margined growths, the edges of which are everted towards the skin. These growths are generally superficial, and rarely extend into the subcutaneous cellular tissue. The superficies is reddish, uneven, and not inclined to bleed. The secretion is a clear serum in slight amount, so that there is no crust formation. The lupus tumor slowly extends forwards; more and more of the neighboring skin becomes infiltrated, and the destructive process proceeds, while the parts first affected may be in process of cicatrization.

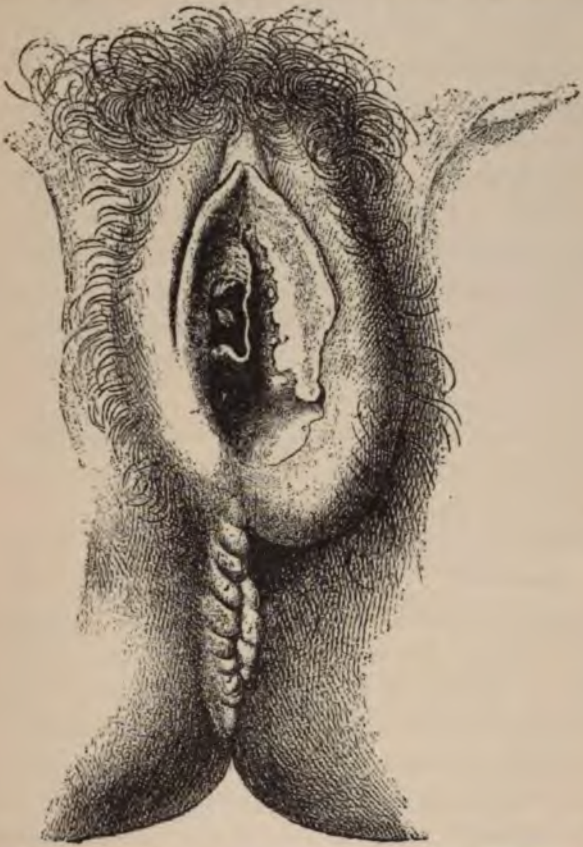


FIG. 55.—LUPUS PERFORANS AT THE INTROITUS VAGINÆ, AND LUPUS HYPERTROPHICUS OF THE VULVA, PERINEUM, ANUS AND RECTUM. (After *Huguier*.)

When the entire external surface of the external genitals has been invaded the internal organs are in turn affected. This happens only slowly, after the lapse, indeed, of years. The disease of the external genitals results in cicatricial contractions of the external opening, the vagina and the rectum. If the process extends inwards it may affect the organs in the peritoneal cavity and lead to intestinal contraction.

The glands in the neighborhood are usually affected. In one of Winckel's cases they were not, and in the other they were for a long period. The state of the general health may for years remain good. Supervening pregnancy has only an unfavorable influence in those cases where the vagina and the vulva have become narrowed by the cicatricial process, and the child can only be delivered by rupture or tearing of the parts. In one of Bernutz's cases there followed peritonitis and death.

Lupus, or esthiomene of the vulva and vagina, may if not interfered with progress towards cure. Intercurrent attacks of erysipelas have a notable influence. Cure, even as in lupus of the face, may follow, although Martineau states that in the case seen by him the cure was only apparent, since after two months there was recurrence. Ordinarily, however, the disease ends in death through the development of phthisis, Bright's, intestinal obstruction, or by perforation into the bladder or the rectum.

The connection between lupus and tubercle has often been noted. Especially in lupus of the face have the giant cells been found which are considered characteristic and specific of tubercle.

The differential diagnosis lies between eczema, herpes circinatus, leprosy, cancer, and certain syphilitic ulcerations (the phagedenic chancre, the tubercular ulcerating syphilides, and sclerosing syphilitic edema of the vulva). Eczema and herpes run an entirely different course and remain superficial. Time makes the differential diagnosis. The same is true of cancer, even if at first glance the diagnosis is not made. We very rarely see leprosy at all. Tubercles have a different appearance, being dark or black, and they are not painful. Syphilitic ulcerations are clearly to be differentiated by the results of specific treatment.

The internal remedies recommended in the treatment of lupus are mainly used on the assumption that the affection is dependent on a scrofulous taint. These remedies are iodide of potash, mineral waters containing iodine, the iodide of iron, cod-liver oil, arsenic, and the like. It is questionable if without energetic local treatment these drugs are of any avail. In case syphilis is suspected the usual remedies are, of course, indicated.

Lupus is apparently of an infectious nature, remaining for some time localized, and therefore it is in particular essential that all the diseased process possible should be removed. All means to this end have been advocated. E. Martin uses the fuming nitric acid, the patient being chloroformed. He first applies cotton dipped in nitric acid for a few minutes, and then ice compresses to relieve the pain. When the slough has separated he makes a second application of nitric acid, 1 to 500. At the end of a month the surface is covered with healthy granulations and cicatrization has begun at the margins. Huguier recommends arsenic; G. Veit, caustic potass; Guillaumet, sulphuric acid. G. Veit applies the stick of caustic potass to the bottom of the nodule as far as the sound tissue. G. Hüter advocates the use of injections of phenic acid, Crègny poultices of a five per cent. solution of chloral hydrate every day, whereby a case was cured at the end of two years. It is a question here whether the cure was not spontaneous. Where hypertrophy is present as the result of lupus we should resort at once to excision, especially since Huguier and Nélaton have thus obtained good results.

CHAPTER X.

TUMORS OF THE VULVA.

VARICES.

DURING pregnancy varices are very frequently met with. The congestion of the blood-vessels, the result of interference with the free circulation, is the cause, superadded to which is increased blood pressure and distensibility of the cellular tissue. So common are varices in women who have borne many children that they are considered by the laity ample evidence of child-bearing. They appear to a greater degree on the limbs than on the labia, although in the latter locality they may attain enormous dimensions. Holden reports the case of a woman who, in the fifth month of her fourth pregnancy, had on the legs varicose veins the size of an intestine, and on the labia the size of a child's head. This distension was only so marked in the erect position. Premature labor was induced, but the woman died a few weeks afterwards of phlebitis.

In general, varices of fair size give rise to no symptoms. Those of the limbs cause edema; on the labia they are exposed to injury from rubbing, and excite scratching.

Distension of the veins during pregnancy is frequent. Congestion is more excessive, the varices increase in size, and often rupture. There are on record many instances where a varix ruptured during pregnancy or in the course of labor, so that the patient died before the physician could reach her. The chances of rupture are, of course, greater when a woman under such conditions is unfortunate to fall. There are two recorded instances where women, in consequence of injury so received, bled to death in from forty to seventy-five minutes. (Hyde and Rochè.) As causes of rupture may be instanced rubbing of the skin of the labium against the thigh, and strong muscular effort. Hildebrandt mentions a case of hemorrhage towards the end of labor in a multipara from rupture of a varix induced by effort in carrying a waiter full of dishes from the kitchen into the dining-room. The hemorrhage was so profuse that the woman would have succumbed had she not fortunately lived near the Maternity hospital.

The rupture site in the wall of the vein is often so small as not to be discernible on autopsy.

The prognosis of varices depends on the size of the tumor. Smaller ones have less tendency to rupture, and hence the prognosis is more favorable. The treatment aims at controlling the hemorrhage, which may be accomplished for the moment by compression, and, as soon as the necessary preparations have been made, by careful suture. That the patient should at once be placed in the horizontal position and receive stimulants is self-evident. In case of large varices we should use compression as a prophylactic measure. This may be readily accomplished on the legs by bandages, but it is difficult to apply it to the labia. The T-bandage is a good means, associated with rest in bed.

Hematoma or Thrombus of the Vulva.—Rupture of varicose veins into the sub-cutaneous cellular tissue of the labia may lead to the formation of a hematoma. Usually this forms without the varices having been previously noted, either from undilated veins or small arteries or else from rupture of the corpora cavernosa. Von Weckbecker-Sternefeld, Wucher, Stocker, and others, have stated that in the instances they observed varices were not present. The cause of rupture lies almost always in labor, or in injuries of the genitals from blows against sharp objects. During labor the cause is seldom direct injury, but precipitate birth of the head, which induces excessive traction and rupture of the blood-vessels. The forceps is certainly rarely to blame, but by means of them, when rightly used, the formation of the hematoma will be prevented.

Aside from pregnancy and labor, hematoma of the vulva occurs only as the result of great mechanical injury, as by falls; still von Franque reports an instance where the only apparent cause was great abdominal effort.

In labor, pressure and congestion in the vascular system are greater than under other conditions, and therefore hematomata are more frequent and of larger size. During labor there are a number of instances on record where in a short time tumors the size of a child's head formed. Aside from the puerperal state they are almost never met with larger than a hen's egg. Schneider mentions a case where, in the presence of such a tumor, version was performed with the result of its rupture. In another case the forceps was used, and a hematoma afterwards formed in an otherwise healthy multipara. The tumor ruptured and gave exit to two pounds of blood. It has often, further, been noted that soon after the formation of the tumor hemorrhage has occurred. Hematomata may also first form after the termination of labor. As explanatory causes we must look to the stretching of the genitals, and the distension of the walls of the genital tract as the primary, and to labor itself as an immediate cause, even though the overfilling with blood of the sub-cutaneous cellular tissue only follows secondarily.

The course of large hematomata is often lightning-like, the large tumor frequently bursting when the fetal head has only reached the centre of the pelvic cavity, and death following rapidly. (Cases of Steudel, Riecke, Carus, and others). At the autopsy the cavities which had contained the blood were from 1½ to two inches broad.

As a rule the hematoma only invades one labium. Sedillot and Beaudelocque have, however, seen one or more hematomata in both labia.

Recurrence of these tumors is exceptional. One physician alone has recorded an instance of recurrence in the next succeeding pregnancy.

The first symptom of hematoma is a transient sensation of pain. Then comes the feeling of traction and pressure from the blood in the cellular tissue, and concomitantly the violet-colored tumor appears in the labia. Many women complain of frequent desire to micturate. When the hematoma is large, fluctuation is to be detected. Further symptoms either point to hemorrhage or else to inflammation, as, for instance, either a weak small pulse, great restlessness, or fever, intense localized pain, and retention of urine. The sensation of pressure in one limb depends on distension of the artery higher up. Owing to the great stretching of the skin gangrene readily sets in at some point with inflammatory symptoms, and occasionally in the presence of most acute septicæmia the purulent contents are evacuated.

In case during labor the tumor is so large or extends so much into the vagina as to lead to fear of rupture during delivery, it is questionable if it be not good practice to incise the mass and suture the bleeding vessels. It may be that the position of the head is such that much hemorrhage is not possible, in which event, of course, interference is not called for.

The prognosis of intra-partum hematoma vulvæ is serious. From an old compilation of Deneux it appears that out of sixty women so affected twenty-two died, and in every instance where death occurred before the completion of delivery the child could not be saved. Hematomata outside the puerperal state are never so large nor so serious.

As for the treatment we simply refer here again to the value as a prophylactic measure of the T-bandage. The nurse must be instructed to send at once for the physician in case a hematoma forms during labor. If she waits till the hematoma bursts, then, as has often happened, the physician may only reach the patient after her death. To cause absorption of the tumor by means of compresses, etc., during labor is of course out of the question. Large hematomata in this situation are liable to worse accidents than simple rupture, such as purulent degeneration. After incision the hemorrhage may be checked by sutures and ligatures. In case one labium is distended by the hematoma, then, after careful disinfection of the skin and shaving of the pubes, it may be incised at its lowest part. In case the swelling extends further up, however, then the crease between the greater and lesser labia is distended, and this is where the incision should be made and the cavity evacuated.

To prevent the forming of pus and to hinder great extension, cold compresses or ice bladders may be laid over the tumor. In view of the disastrous results of procrastination, that treatment should be instituted for all hematomata larger than a hen's egg which consists in free incision and ligature of the vessels. Why, indeed, should we wait until the blood has distended the cellular tissue? By waiting so long, the blood has already degenerated, and then incision, etc., is far more dangerous. Smaller hematomata are quickly absorbed and project so little that surgical interference is not necessary

That careful antisepsis is called for, we rigidly insist. The expectant treatment has the further disadvantage of requiring protracted stay in bed.

Condylomata.—Properly, condylomata should be spoken of in connection with venereal diseases. We must refer to them here, however, because under certain conditions, namely neglect, they may develop into tumors of considerable size, which may be mistaken for other forms. These condylomata are in appearance best compared to blackberries or to mulberries. They vary in size from a pea to a bean. Some are broad, spreading and pointed; others are conglomerate and cover the free edge of the nymphæ from above below. The edge of the labia minora becomes one to two finger-breadths in thickness and bleeds readily. The growth of condylomata is always dependent on some irritant. The most common cause is a profuse leucorrhea, the virulent blennorrhagia, to which latterly the erroneous term gonorrhea has been applied. In certain cases the slight inflammations, the result of degeneration of the smegma, may unquestionably cause the formation of condylomata, but they may also result from non-infectious balanitis or vulvitis. During pregnancy discharges are very common, and therefore there exists a tendency to the formation of these growths. The so-called vaginitis granulosa, the papillary hypertrophy of the vagina, are deemed to be dependent on a specific leucorrhea, and in pregnant women both these conditions are often found. By pulling apart the papillæ genuine condylomata are found. It is likely then that both conditions have a similar origin. Histologically these condylomata are papillary tumors, and more than once it has been claimed that they should be called papillæ.

Hildebrandt describes a peculiarly interesting case in a puerpera, where on the right labium majus there existed a tumor the size of an apple made up of condylomata. Small remnants of condylomata were at the lower part of the vulva. The tumor disappeared without treatment at the end of eight weeks.

The experiments which have been made by Kranz and by Güntz to transplant condylomata in order to determine if they were specific were not conclusive. It is not denied that these growths are especially frequent in cases of gonorrhea. Where this disease is present such a condyloma may appear. How many virulent cells were transplanted with these condylomata no one can say. The experiments would only be of value when carefully disinfected condylomata should cause the growth of other similar excrescences. Further, many of the transplantation experiments were entirely negative.

That condylomata have nothing in common with syphilis is granted, although it has been proved that papillomata may spring from syphilitic soil. The tertiary syphilitic papillomata, which grow at the vaginal entrance, have generally a different appearance. Their surface is not so much divided up like the mulberry as is that of the condyloma.

As to whether true condylomata may exist in the absence of specific infection will shortly be determined by careful search for the gonococcus. To-day it is probable that condylomata may exceptionally exist without such a specific cause. Vulvitis of a simple nature may result in their growth. Pregnancy predisposes to their formation in that during its course there is usually present a profuse and lasting leucorrhea. The congestion customary to the gravid state is a further cause. Recurrence in after pregnancies prove these assertions to be true.

Condylomata rarely produce symptoms. If they are large, however, they may even imperil life. I had a patient with a large number of condylomata on the left labium minus. During labor there occurred a tear of the vagina which extended into these masses, and caused a profuse hemorrhage difficult to check. In the puerperal period these condylomata degenerated, resulting in pelvic abscess and death from puerperal fever.

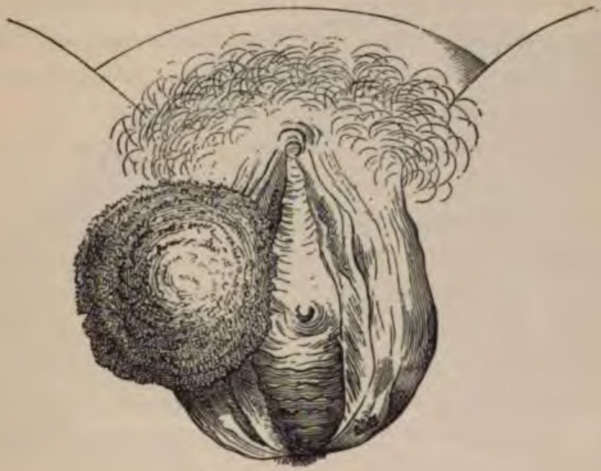


FIG. 56.—CONDYLOMA.

I believe the correct practice to be to remove condylomata, seeing that this may be accomplished without pain or risk. Cleanliness and injections will cause the accompanying factors to disappear. Isolated patches may be treated by the milder caustics, or else they may be cut off. Removal by the scissors is certainly more radical, but if the site be not cauterized the growths will recur. After excision the base should be touched with nitric acid, and then lead compresses applied. Levy of Munich has thus entirely cured these excrescences. Formerly, powdering with alum or sugar of lead was recommended, as also cauterization with creosote, sublimate, strong sulphuric acid, chromic acid, Fowler's solution. The creosote is used pure; the sublimate in solution of alcohol or collodion, 1 to 8; chromic acid, 5 parts to 8; Plenk's solution, consists of bi-chloride of mercury ʒ ss., dissolved in ℥ i. each of alcohol and concentrated acetic acid, to which is added camphor, alum, lead; each gr. xxx. The solution is not to be filtered.

Elephantiasis or Pachyderma Vulvæ.—Under these terms is included hyperplasia of the skin with consecutive increase in the sub-cutaneous cellular tissue leading to enormous enlargement and thickening. The disease affects, in particular, the lower extremities (ninety-five per cent.), and from the enormous swelling of the leg and the obliteration of the ankle crease, the disease resembles an elephant's foot, and therefore its name. The disease affects, in addition, the genitals, the scrotum more frequently than the vulva, the mammæ and the anus.

The essence of elephantiasis is great thickening of the skin. The surface is smooth and shiny (elephantiasis glabra), or else with elevations (elephantiasis verrucosa), or else covered with hypertrophied papillæ (elephantiasis papillomatosa). Other distinctions are into elephantiasis dura and mollis. In the one case section through the diseased skin reveals a mass of dense fibrous tissue, and pressure with the finger leaves no impression; in the soft forms there is succulency and pitting, even as in edema. From the section there flows considerable watery matter like lymph from the dilated vessels, which are more readily distended than normally (elephantiasis lymphiectatica).

The disease is always local and has no tendency to become generalized. Microscopical examination gives different results. In elephantiasis dura the tissue consists in dense thick bundles of fascia. The elements are spindle-cells with large oval nuclei. In Schliz's preparations there are further white blood corpuscles and lymph corpuscles in large amount and regularly disseminated. These are also found in considerable numbers in the papillary layers of the cutis, arranged in circles. It is clear that these last cells are lymph cells, and that the density of the tissue depends on their number and their size. It is from these cells, further, that the milky exudate comes. As characteristic of the acute form of the disease the distension of the lymph-vessels has long been noted and described. But there is divergence of opinion in regard to the nature of the distension. Duchassaing claims that the disease is due to repeated attacks of erysipelas, and that there is stasis of the lymph and resultant peripheral varicosities. As a result of the inflammatory process the afferent lymph vessels are obliterated. The lymph stasis and consecutive hypertrophy of the tissue occur in layers, because, customarily, the adjoining lymph glands swell and oppose further progress; thus in disease of the lower limb the glands at the knee are affected, and in disease of the labia the inguinal glands, constituting indolent buboes. That lymph stasis may lead to elephantiasis many examples prove. Wernher, who does not entirely admit this, describes a case where evidently elephantiasis was caused by obliteration of the lymph-glands. A strong and otherwise healthy maiden acquired, as the result of syphilitic infection, a distension of the lymph-glands, so that those of the right suppurated and were destroyed. The syphilis and the symptoms from the buboes were cured. Three months later she was seen with marked elephantiasis of the right labium, which was of the size of a child's head. Wernher hence concludes that although exceptionally elephantiasis may exist as the result of lymph stasis, this is not usually the case, for there is not only no narrowing of the lymph-vessels through swelling of the endothelium, but, on the contrary, a great widening of those vessels so that any one can readily inject them. Wernher is certainly correct in the assertion that from one or two examinations we cannot vouch for lymph stasis because there is dis-

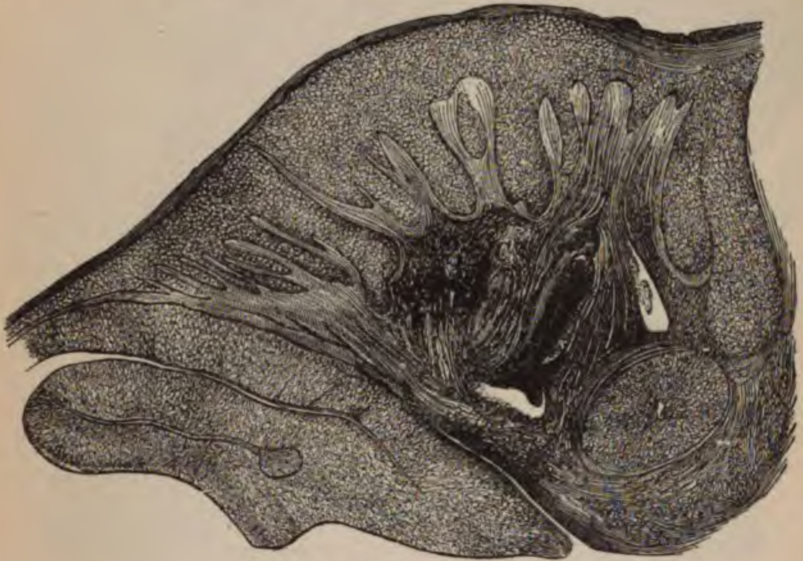


FIG. 57.—ELEPHANTIASIS. (After *Beigel.*)

tension of some radicles, seeing that there is also present obliteration of many if not the majority of the efferent radicles.

In particular are the lymphatics altered in separate papillæ. While, according to Teichmann, the extremities of the lymphatics never normally reach the very end of the papilla, in a case of amputation of the foot on account of elephantiasis the injection could be made much more completely. All the papillæ, apparently unchanged in gross appearance, were really enlarged, and this enlargement included the lymphatics in all their dimensions. The extremities of the lymph-vessels were in particular widened, while the main branch which extended to the knee was normal. A similar description has been given by Herdy, and Schliz's microscopical examination leads to the same results.

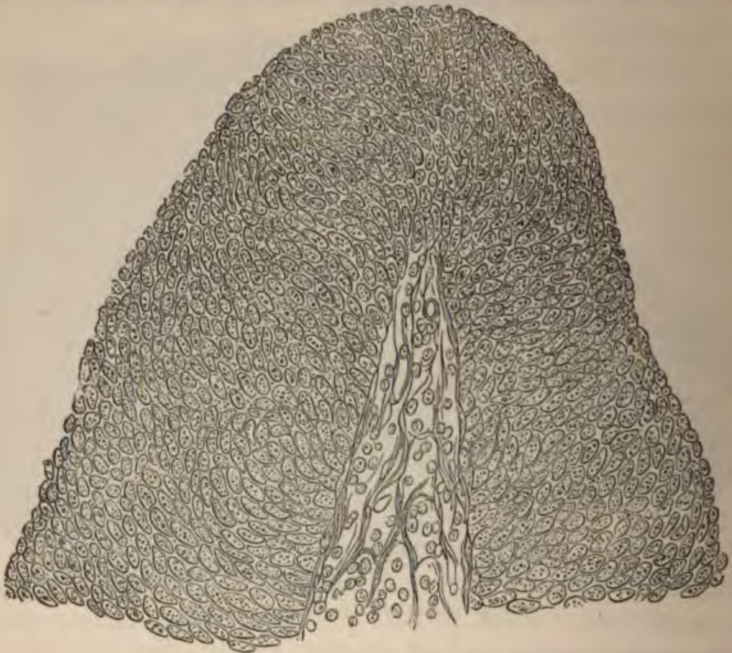


FIG. 58.—ELEPHANTIASIS. (After *Beigel.*)

The lymph-vessels of the superficies of the section are in part ectasic; those of the deeper layers and partly of the superficial are narrowed by swelling of the endothelium. According to Schliz the deeper portions of the skin are first invaded by the disease, and there the obliteration is, at the outset, to be found. He claims that the cause of elephantiasis and its pathogeny depend on stasis in the extremities of the lymphatic vessels, and Wernher has recorded two instances which speak in favor of this view, although he does not grant its general truth. It is, however, allowable to think that the affection may depend on a spontaneous swelling and widening of the lymph-vessels, and that this leads to great ectases.

From the diseased skin there flows on section an amount of lymph, indeed there exists occasionally a lymphorrhea from openings admitting only a hair. The papillæ are exceptionally altered. They are usually of irregular shape and of variable size. According to Rindfleisch they are, in general, hypertrophied, but this hypertrophy is seen only in the later stages of the disease. On the surface of the papillæ there are not rarely elevated excrescences, which, when they are marked, resemble condylomata. Instances of the kind have been described by Henle, and on the labia by Virchow, Desruelles, Krieger, and Dietz.

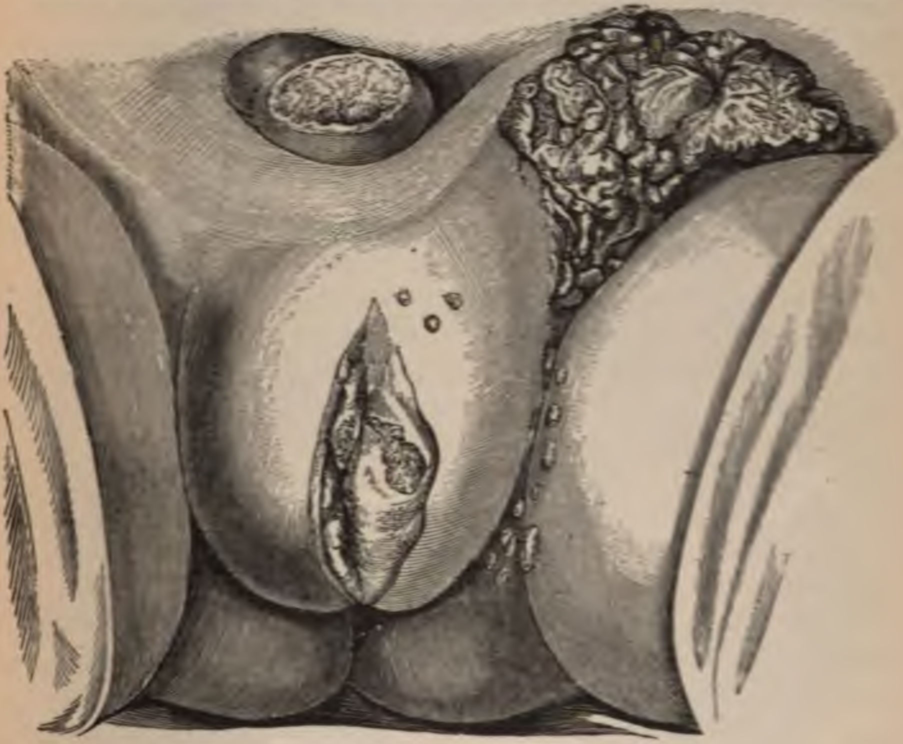


FIG. 59.—ELEPHANTIASIS.

The cutis is greatly thickened, as well as the horny layer of the epithelium. The hair follicles on the legs largely disappear, although those which remain are normal in structure. The cellular tissue is greatly thickened from the increase in the interstitial tissue, so that the fat has disappeared. The blood-vessels of every calibre are distended, but their walls are normal. (Schliz.)

Elephantiasis occurs in the tropics and in the sub-tropical zones very frequently. It is rare with us. In certain of the lesser Antilles, Barbadoes for instance, every tenth individual is affected. In these countries, the West Indies in particular, elephantiasis begins with fever and its accompaniments, and further with erysipelatous swelling of the affected skin (usually of the lower limb). The fever only lasts a short time, thirty-six to forty-eight hours, and on its disappearance there remain edema and swelling of the affected parts of the skin. In the leg, along the crural artery, there exists a hard, sensitive cord-like swelling, which may be followed to the neighboring lymphatic glands, and is a characteristic sign of elephantiasis arabum, at least of the acute type. In our climate the disease never develops so acutely. In the further progress of the acute form there are recurrent attacks of erysipelas, and a constant increase in the swelling.

On all the affected parts, especially the genitals, there appear ulcerations the result of rubbing, uncleanliness, and stagnation of the discharge. These rarely extend deeply, at least on the legs, although in case of the vulva Louis Mayer has reported an instance of deep ulceration which suggested carcinoma. These ulcerations resist all treatment. They may alter into fungous tumors or rodent ulcer. The secretion consists in a lymph-like fluid which through stagnation may become fetid. These ulcers are often of the size of a fifty-cent piece, rarely larger. As the result of the swelling and tension of the affected tissue a superficial gangrene may supervene. Finally, as the result of fatty degeneration, elephantiasis may change into sarcoma or into cancroid.

All the varieties of elephantiasis are found on the labia. Where the increase in interstitial tissue is in the deeper parts there exists dense swelling; where certain portions develop greatly there result marked elevations (elephantiasis tuberosa). The pathology of the disease is ever the same. The least constant thing about elephantiasis of the vulva is the swelling of the lymphatic glands. The site of the disease on the vulva is, according to Mayer, in forty-six cases, of which number ten were personal, the labia majora with the other parts were affected in twenty-seven, the clitoris alone or with other organs in sixteen.

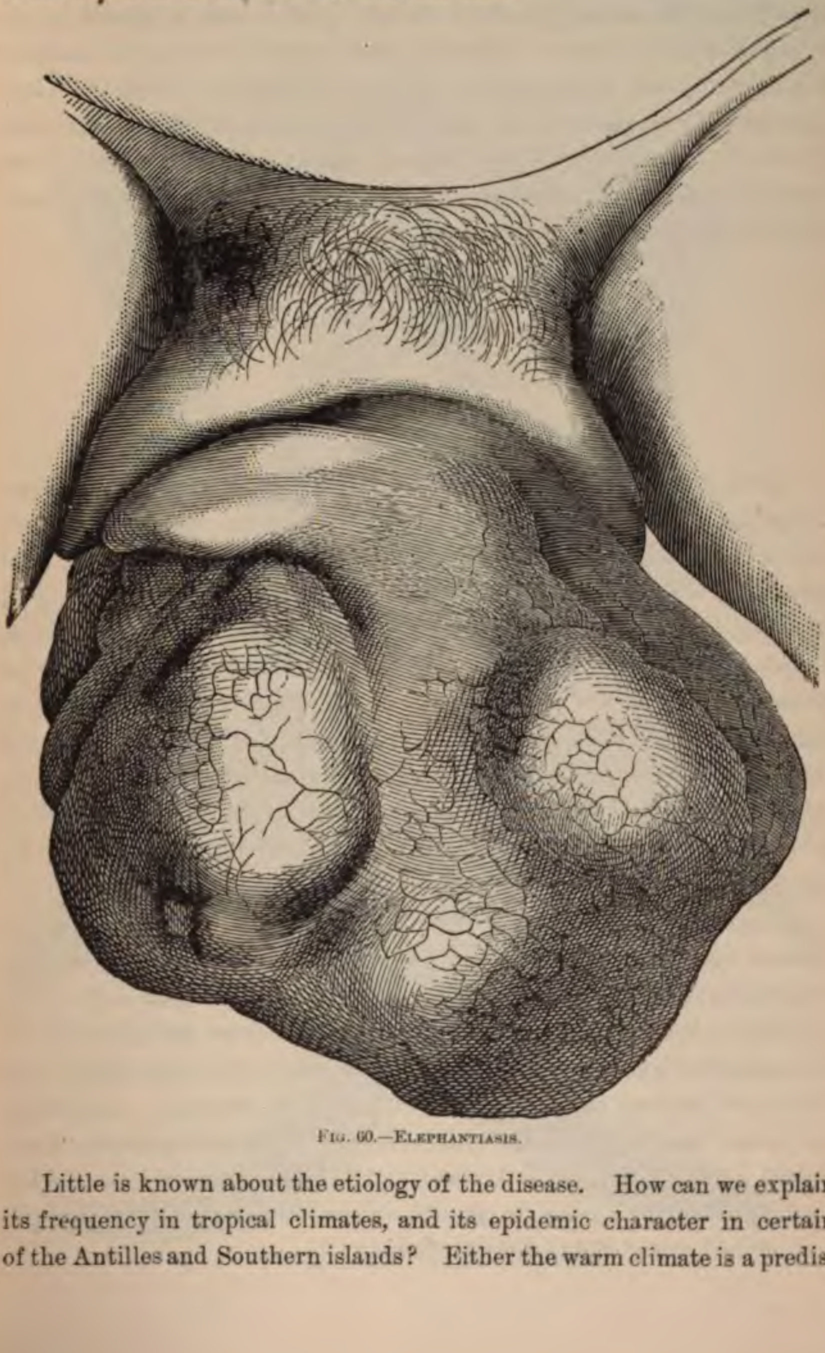


FIG. 60.—ELEPHANTIASIS.

Little is known about the etiology of the disease. How can we explain its frequency in tropical climates, and its epidemic character in certain of the Antilles and Southern islands? Either the warm climate is a predisposing factor as favoring the development of erysipelas, or else the cause must be sought in a specific infection. Similar views have been held in regard to elephantiasis græcorum or leprosy, and here a specific micro-organism has been found. That the filaria sanguinis is not the cause of elephantiasis may be emphasized. Lewis has certainly found the filaria in a case of lymphatic elephantiasis of the scrotum, but he does not claim it as the certain cause. The disease ordinarily appears on the vulva during the period of sexual activity. In thirty-seven cases, which Louis Mayer grouped according to the age of appearance, we find:

4 cases before 15 years.
4 " between 18 and 20 years.
18 " " 20 " 30 "
8 " " 30 " 40 "
3 " " 42 " 58 "

Krieger has reported a case which began in very early life, and where, at the age of fourteen, the tumor was twelve inches long and eighteen inches in circumference. Louis Mayer's case began at nine years. Besides these two cases instances have been recorded by Delpech, Caswell, Clot-Bey, and Bryk, of elephantiasis during youth. The child seen by Delpech had a dense tumor on the mons veneris the size of a cherry. At puberty it had grown to the size of an apple, and rapidly increased so that at the age of thirty-one it reached as far as the knees, being 17½ inches long and fifteen in circumference. Still more remarkable was Bryk's case, where a tumor the size of a bean remained stationary till forty-eight years, and thence in two years reached a circumference of 9¾ inches.

Heredity has not been noticed as a causal factor. On the contrary, cases of congenital elephantiasis are exceptions. Nahde saw a new-born infant with small red spots, particularly on the labia majora and in the inguinal regions. They increased in size so quickly on the labia that at six weeks they were the size of a pear. They then grew more slowly than from their previous rapid development was to be expected. At fifteen the tumor was the size of a child's head. In Bainbridge's case there existed a tumor of the clitoris three inches long, and nearly two inches thick. In Verneuil's case the growth was on the mons veneris, the upper half of the left and the entire right labium.

Of special interest are those cases where a transient or lasting injury preceded the development of the tumor. Louis Mayer has investigated them as carefully as possible to determine the influence of traumatism.

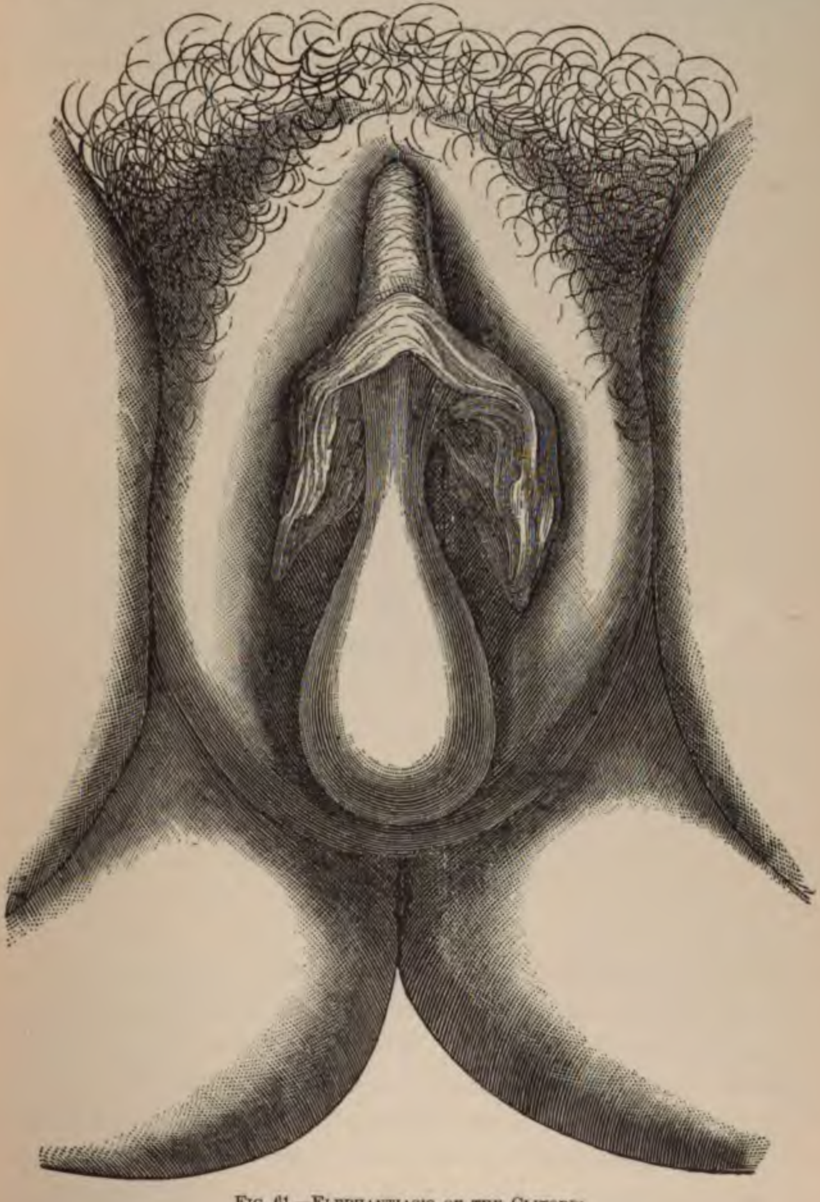


FIG. 61.—ELEPHANTIASIS OF THE CLITORIS.

A woman seen by him, aged twenty-five, developed elephantiasis of the vulva as the result of deep injury to the right labium received by a fall downstairs. For a long time she complained of pain and of swelling on this side. The pain disappeared but the swelling persisted, until at the end of seven years it had attained the dimensions of a child's head. In another case (the ninth of Mayer's) the injury was received from a mangle.

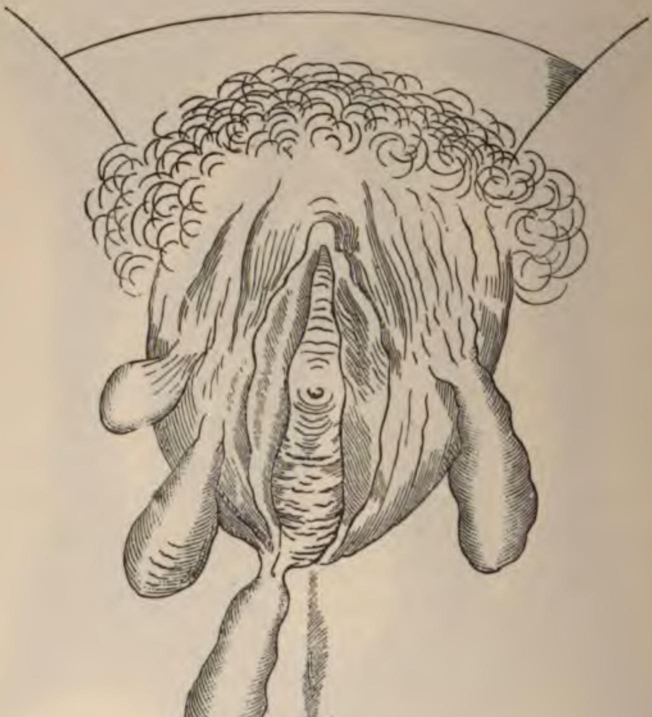


Fig. 62.—(After *Hildebrandt*.)

At the end of a year the woman had a tumor the size of a hen's egg, and after some time it attained a length of 5⅓ inches, a breadth of 3½ inches, and a pedicle over ½ inch thick. Caswell speaks of a blow on the vulva, Riecken a wound from pushing a carriage. In Hildebrandt's case, suffering from multiple mollusca, the woman laid her disease to her husband's habit of forcibly rubbing her genitals each night.

These observations and the oft-repeated opinion that masturbation caused the disease, are still not sufficient to prove such factors as true causes, since trauma preceding the disease is too rare, and trauma not followed by the disease too frequent.

Inflammatory affections of the skin as the basis of elephantiasis do not rest on any more certain basis. In these affections we include eczema, furunculosis, syphilitic infection. The soft chancre, when it has existed for a long time, does cause swelling of the nymphæ. As the result of syphilis Louis Mayer saw twice irregularly-shaped and nodular tumors. Clott-Bey, MacClintock and Bryk have noticed the same. Many authors have noted that irritating vaginal discharges, intertrigo, and dermatitis, favor the development of elephantiasis. In a case observed by Atthill, a tumor the size of a child's head developed as the result of the prolonged use of a wash prescribed for the relief of prurigo. Interferences with the pelvic circulation with great menstrual disturbances have often been suggested as causes (Larrey, Klewitz, Beigel) without throwing any special light on the etiology of elephantiasis. The influence of pregnancy and of the puerperium, which naturally leads to small hyperplasiæ only, is not granted. Some authorities have noted increase and others decrease in the tumors. Although we should naturally expect growth during pregnancy Louis Mayer witnessed decrease. That labor has any influence Hildebrandt was unable to state.

At the outset the symptoms of the disease are practically *nil*. The slightly enlarged labia may cause deviation of the stream of urine, and discomfort on sitting. Marked symptoms, however, only appear when the tumor has become large enough to cause inconvenience in walking, standing, or in working. The large tumors cause retention of secretion, and interfere with the stream of urine, thus leading to abrasion of the skin. There is present a disagreeable smell which robs the patient of appetite. After a short time there occur superficial inflammations and tumor formation. Frequently the tendency to ulceration is increased by the outflow of sticky serum. Those patients are in the worst condition who suffer from incontinence of urine through pressure of the tumor on the urethra, for here large surfaces of the skin are ulcerated and irritated by the constant flow of urine. These circumstances render the disease a chronic one, and the affected individuals die after a longer or a shorter interval.

The prognosis as regards life is, in general, good. Aside from causes due to the size of the tumors and the loss of strength from the exudation, death from elephantiasis of the vulva has never been noted. Klebs records an instance where a woman aborted, and where fatal peritonitis set in, the result of absorption probably from the open and abraded surfaces. Still, cure of this disease is not to be expected either spontaneously or from medication. We may not even hope to lessen the growth of the tumors by means of caustics. The most certain way of effecting cure is by surgical interference. The operation cannot be called a difficult one. Speedy cure as the result of ablation has often been noted, frequently at the end of five days.

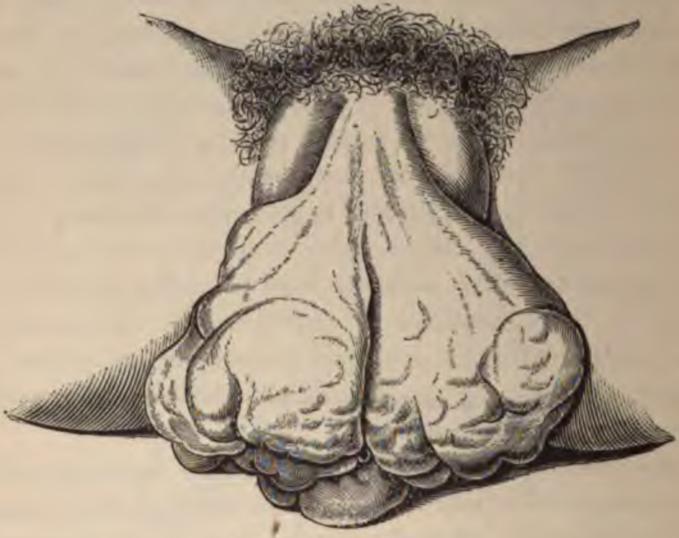


FIG. 63.—ELEPHANTIASIS.

The differential diagnosis lies between fibroids of the labia, condylomatous tumors, cases of deep-spreading ulceration accompanied by loss of substance, carcinoma, lupus, and finally disease of the Bartholinian glands, abscesses, etc.

The differential diagnosis between fibroid and elephantiasis may exceptionally be difficult. Many of the reported cases of elephantiasis unquestionably belong in the category of fibroid. Where tumors springing from the skin and readily movable under it exist, which have the peculiar fibrous feel, the certainty is in favor of fibroids. Elephantiasis is a disease of the skin and of the sub-cutaneous cellular tissue. When the tumor consists of greatly thickened skin and of extensive infiltration of the cellular tissue, then it is elephantiasis. Even here, however, as the result of unequal hyperplasia of the cellular tissue, distinct nodules, hard and soft in places, may be detected.

In the beginning, certainly, elephantiasis of the vulva does not present the acute inflammatory symptoms and the erysipelatous eruption which characterize the disease of the lower extremities. The inguinal buboes are also often lacking (Mayer), so that here also there exists no point for differential diagnosis from fibroids.

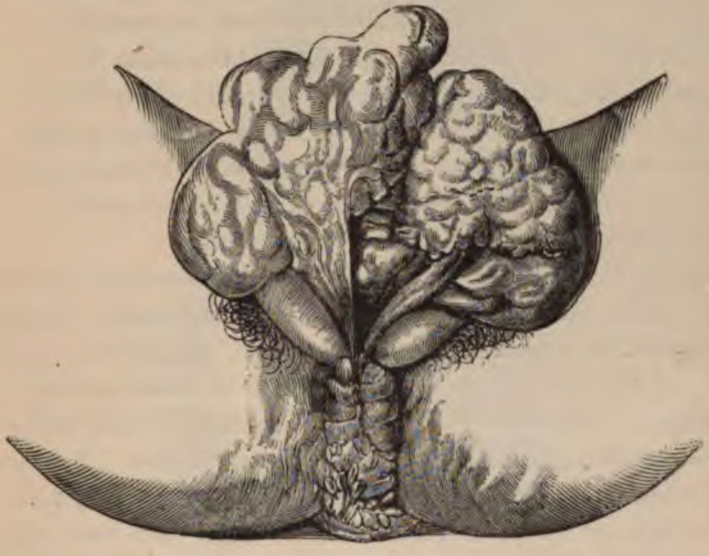


FIG. 64.—ELEPHANTIASIS.

Careful examination will differentiate condylomata. They possess a soft, not an indurated surface. The condylomatoid papillary excrescences of elephantiasis spring from a thickened hypertrophic skin.

Malignant tumors are differentiated by their sharp outline, by deep isolated infiltration of the skin, and by their speedy progress. Lupus, also, extends much more deeply than does elephantiasis. With furuncle or abscess, both of which are products of inflammation, and are accompanied by pain and fever, elephantiasis ought never to be mistaken.

In the beginning of the disease the treatment aims at checking its progress, but the results are not marked, since we do not know the causes at work. Antiphlogistics have been resorted to, as well as venesection, but elephantiasis has not thus been checked. In case of elephantiasis cruris Hebra has used a bandage with success, but this treatment is not applicable for any length of time to the vulva. In case of large tumors removal, as in other growths, is the best treatment. Surgical treatment is the simpler on the vulva, because there are no included organs, as in the scrotum, to beware of injury. Large tumors reaching even to the knee have been removed by Petit, Rogers, Tansini, Mason, Roubais, Louis Mayer, Leteuneux, Wassink, Dittel, and others. Hildebrandt found only two deaths recorded; one case of Green's, 1835, where a tumor springing from the mons veneris and reaching to the knee was removed by a crescentic incision. The wound did not heal, and the woman died; a case of Bourguet's, 1867, where a large tumor of the right labium drew down by its weight the anterior vaginal wall and the bladder and urethra. The operation was of long duration and was accompanied by much hemorrhage. Finally the one inch thick pedicle was removed by the *écraseur* and the bladder wounded. The patient died of peritonitis.

The operative methods are: The ligature, the *écraseur*, the galvano-cautery wire, the knife and scissors. The complicated methods, by crushing and burning, aim at little hemorrhage, but they do not certainly fulfill this aim, and they are not so valuable as the operation with a knife and scissors. The ligature has the disadvantage of being followed by long-continued suppuration, and it should be rejected. The *écraseur* leaves a wounded surface which will not heal by first intention. The same remark applies to the galvano-cautery wire. The great objection, however, to all these methods is that there is no certainty of removing all the diseased mass, as there is by the knife. Only after such an operation is it possible to restore the genitals to their proper shape and appearance. Finally the ligature, *écraseur* and the galvano-cautery are only applicable to more or less pediculated tumors. Extirpation has frequently been performed without special loss of blood, by inserting needles through the base of the mass, throwing an elastic ligature around them, thus constricting the tumor, and then operating above the needles. This method is simple, does not require special instruments, and is followed by union by first intention. Schroeder operates after a different fashion. He also aims at little loss of blood, and therefore a better plastic result. The tumor is pulled forward, and the incision made under it. As the incision is made deep sutures are passed, thus bringing the surfaces together as fast as he cuts.

We would mention here, finally, not as a therapeutic measure, although it has been utilized once by Fehleisen, that erysipelas has a marked influence over elephantiasis, and a number of observations exist where recovery from this disease followed on an attack of erysipelas.

Fibroids.—These tumors grow generally on the labia majora, although they are also found on the perineum and on the nymphæ. They may be enucleated, and they contain, according to Klob, interstitial tissue and muscular fibres. Kiwisch says that these tumors may further arise from the interstitial tissue of the labia majora, from the pelvic fascia, from the periosteum of the bones.

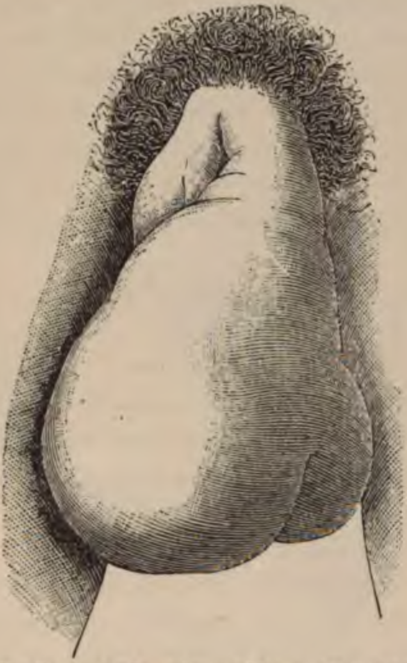


FIG. 65.—FIBROID OF LEFT LABIUM MAJUS. (Author's case.)

Fibroids of the labia attain great size, become pediculated, and may reach to the knees. Scanzoni removed one the size of a man's fist, I myself one the size of a child's head, which in the erect position extended to the middle of the thigh. We would record also a case cited by Klob from Voigtel of an instance seen by Fahner where a tumor weighing twelve pounds and soft in consistence sprang from the left labium. In certain instances superficial excoriations appear on the skin, which may eventuate in purulent degeneration and elimination of the fibroid. (Scanzoni.)

Ordinarily, fibroids are of slow growth, although they increase rapidly under the influence of pregnancy, to decrease, however, even as do uterine fibroids, at the end of the puerperium. (Scanzoni.) Even as in the uterus, also, these fibroids may, according to Scanzoni, be of the nature of fibro-cysts.

When the fibroids are seated only in the sub-cutaneous cellular tissue, the tissue underneath often increases rapidly, the tumor is pushed above the surface and is pediculated (fibroma pendulum). In case the growth is very soft it is called a fibroma molluscum. Such tumors vary in size from that of a poppy-head to a man's head. Here belongs that case reported by Hildebrandt and referred to under elephantiasis, where the growth on the vulva was the result of rough manipulation on the part of the husband.

As to the etiology of these tumors we know as little as in regard to similar growths on other parts of the body. It is interesting to note that Scanzoni deems it probable that occasionally non-resorbed blood extravasations may be a cause. The symptoms are the same as in elephantiasis. They are uncomfortable on account of their weight and traction; they hinder walking and coitus, interfere with the stream of urine, and they lead to ulceration, dermatitis and smarting.

The treatment is similar to that of elephantiasis.

Lipoma.—This form develops from the fatty layer in the sub-cutaneous cellular tissue of the mons veneris or the labia majora. Its characteristics are in many respects similar to those of elephantiasis. The size, the covering of skin, the softness, are alike in both affections. Section through the tumor, however, reveals only connective tissue, in the interstices of which is a large amount of fat. The largest tumor of this kind was seen and operated upon by Stiegele. It developed from the left labium, being sessile, and measuring twenty-five inches in length, 5¾ in breadth, five inches in thickness, and weighing ten pounds. The epidermis was greatly hypertrophied, and nodular in places and depressed in others. On section the meshes of the sub-cutaneous cellular tissue were greatly distended and filled with fat, firm towards the surface, softer in the depths, and mixed with serum. In [illegible]'s case the rapid increase during labor and the decrease after a spontaneous hemorrhage were noteworthy. The patient was operated upon and cured.

Enchondroma.—Schneevogt has reported a case of enchondroma of the clitoris, the size of a fist, which was united to the clitoris by a pedicle a trifle over one inch in length. The woman was aged fifty-six, married but sterile, and suffered from prolapsus uteri. The surface was nodular, was hard to the touch, and on section it was found to be chondroid in texture, and in places calcified. (Hildebrandt.)

Likely enough Beigel's cases of ossification of the clitoris belongs here.

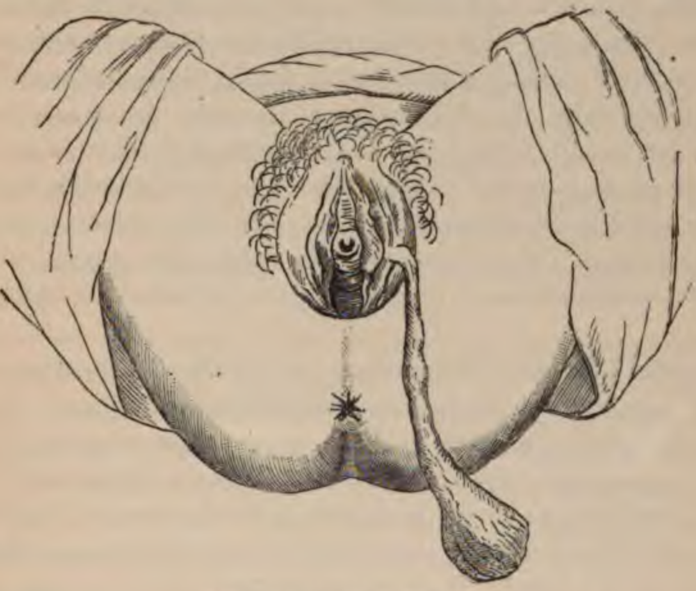


FIG. 66.—PEDICULATED FIBROID.

The first is cited from Bartholin, where a Venetian prostitute had such a greatly ossified clitoris that the men who had intercourse with her were injured. Bellamy showed before the London Pathological Society a specimen from a woman seventy years old. It was a horny growth from underneath the prepuce of the clitoris, which in form and in size resembled a tiger's claw.

Neuroma.—Only two instances of neuromata have been recorded. In Simpson's case there were sub-cutaneous painful nodules near the meatus urinarius.

Kennedy describes small sensitive nodules, often only to be detected by a magnifying glass, which he calls "sensitive papillæ and warts." They are found on the nymphæ and in the vestibule, and result after delivery from imperfectly healed ulcerations. According to him they are hypertrophic granulations which were not fully organized and were not covered with normal epithelium. He advises their removal with the scissors.

Cysts.—Aside from those of the glands of Bartholin, cysts form in the labia the origin and cause of which is unknown. They may be retention cysts. The ducts of Gärtner open into the urogenital sinus, and these might develop into cysts. An instance of this kind has been recorded by Hoening, although here the cyst extended between the walls of the vagina—how far is not stated. The cysts forming in Gärtner's ducts are not in the labia but next to the vagina, and the contents, usually a clear fluid, may be seen through the walls. In case of cysts of the vulva this is not possible. Kocks has recently claimed that the extremity of Gärtner's duct, which remains patent in certain mammals, the cow for instance, is very constantly found in the human female as a blind short *cul-de-sac* near the meatus urethræ. The position of cysts of the labia majora, however, makes it questionable as to whether they may be formed out of Gärtner's canals.

Cysts of the vulva develop occasionally superficially, sometimes in the deeper parts, and may occupy and distend the entire labium. They are found in variable sizes, from that of a pea to that of a child's head. It often happens that there exists only one cyst in the labium, and the larger the cyst the greater the probability of the existence of a single one. When two or more cysts are present near one another the tumor in its entirety is apt to be small. As a rule the cysts are unilocular, while in case of cysts of the Bartholinian glands they are apt to be multilocular, although in Werth's case the cyst was unilocular. The contents are usually serous, sometimes clear, and again cloudy. At times it is slimy or colored a chocolate brown, which certainly leads to the supposition that such cysts are related to the glands of Bartholin. Certain authors have recorded instances of fatty degeneration of the contents and of dermoid cysts. The walls of the cyst are of varying thickness. The inner surface is, as a rule, smooth and covered with laminated epithelium, the external surface being in close connection with the surrounding cellular tissue. When these cysts develop downward so as to distend the labia, they may, as in recorded instances, dissect upwards towards the pelvic cavity or between the vagina and urethra. Such cases suggest naturally that the cysts were from Gärtner's canals.

Research must prove as to whether Klob's belief is correct or not, that is as to whether a portion of the cyst develops from encapsulation of blood extravasations, and a portion from ectases of the lymph-vessels. The last supposition would seem to hold analogically from what happens in other parts of the body, for example, on the neck of the new-born child. Werth states as the etiology in his case that an anomalous conglomeration of the epithelium leads to glandular formation, and that through secretion and pressure the cystlet developed.

The symptoms, so long as the cyst is small, are practically *nil.* When larger it interferes with function even as do other growths on the genitals. Disease only in reality is present when the cyst becomes inflamed. There appear fever, pain, and practical inability to walk or to work. The contents become purulent and offensive. If spontaneous rupture occurs there is only palliation of the symptoms, since thus entire emptying of the cyst is not possible, and it refills with recurrence of the same symptoms.

The diagnosis is never difficult, because where fluctuation is not obtainable the tumor may be punctured with the hypodermic needle. Operative means are necessary for cure. Waiting for spontaneous rupture or attempts to cure by incision, are not at all harmful, but the strict curative method is extirpation of the cyst. To cause obliteration of the cyst it may be packed with cotton dipped in iodine. Extirpation is difficult according to the size and extent of the cyst and its union with the cellular tissue.

We will speak further on of disease and of cysts of the glands of Bartholin.

Myoma.—Myoma of the labia has been described by Blasius under the name of collonema. A tumor removed by Hoogeweg had a thin pedicle, and was made up of grape-like cysts. Virchow pronounced it a tumor of this nature.

Angioma.—Only two instances of a growth of this nature have been recorded. Hennig saw a vascular nævus one and three-quarter inches thick in a two year old child, and Sänger found in a ten weeks' old baby an angioma or cock's-comb-like tumor on the right labium, which was .39 inches high, ½ inch broad, and .39 inches thick. At delivery it was only the size of a cent, but grew rapidly. It was excised and did not recur.

Melanoma.—Instances have been recorded by C. J. Müller from A. Martin's practice. The one was a melanomatous sarcoma of the clitoris, the size of a goose-egg; the second developed from the right labium majus and was the size of a walnut. The first patient died of cachexia, the second was cured.

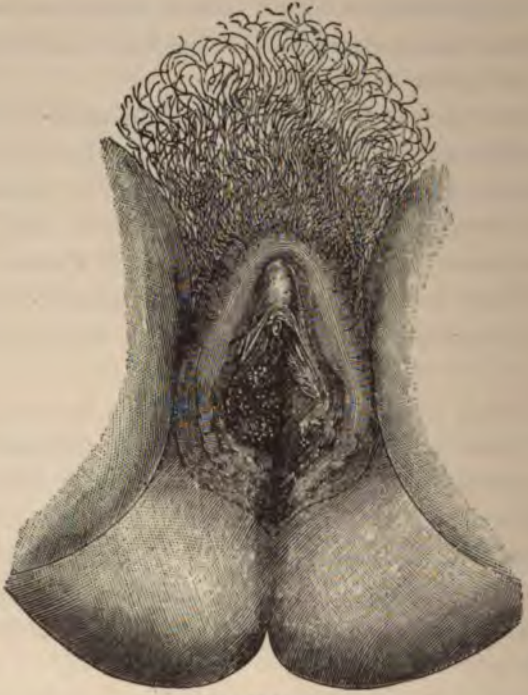


FIG. 67.—CARCINOMA.

Carcinoma of the Vulva.—Under this heading we include all malignant growths, that is to say epithelioma or cancroid, medullary carcinoma, where there exists increase in the stroma and swelling and proliferation of the epithelium (glandular cancer), atrophic carcinoma, called schirrhus by the older writers, and finally sarcoma.

Although each of the above forms has been found on the external genitals, still they are rare when compared to the frequency of occurrence in the uterus. From the statistics of Virchow, Louis Mayer, Marc d'Espine, and Tanchon, it is shown that to thirty-five or forty cases of uterine cancer there occurs only one malignant growth on the external genitals.

According to L. Mayer the frequency on the special organs is: Uterus, mammæ, ovaries, vagina, vulva. In 16,637 patients with tumors, Gurlt found 11,140 females, and of this number 7,479 had carcinoma, and 72 or 10 per cent. were on the vulva. From the gynecological clinic at Basle, Gönner found .5 per cent. cases of carcinoma of the vulva in 5 per cent. of the disease of the female genitals. Of the above forms the cancroidal excels the others in frequency. (Scanzoni and West.) In 9 cases of malignant growths of the external genitals, L. Mayer found 4 certainly and 2 obscurely cancroidal in nature. Hildebrandt in 6 cases of malignant tumor found 3 microscopically to be cancroid.

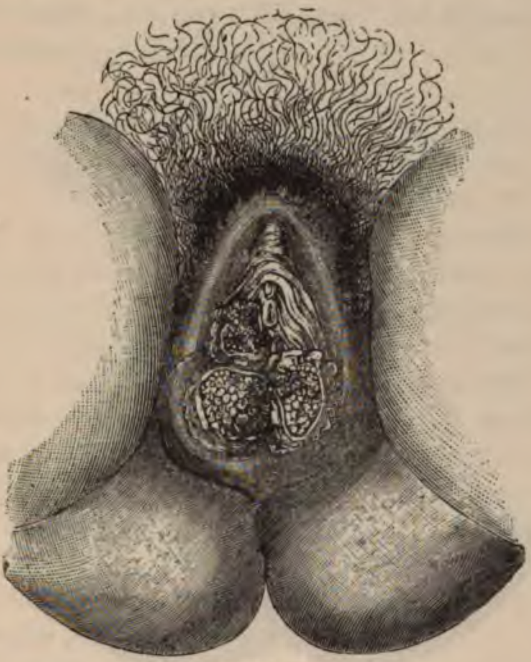


FIG. 68.—CANCROID.

Cancroid.—Its site is ordinarily the lower and inner surface of the labium majus, in the sulcus interlabialis—that is to say, between the external skin and the mucous membrane. In only one instance was the clitoris the origin. (Rokitansky.) At the beginning of the disease there appear small nodules, which raise up the skin and are united to it. These nodules are always covered more or less with thick layers of epithelium. L. Mayer has reported two cases where this epidermal thickening formed extensive callosities, and he found the same appearance on the vulva of young and old women not suffering from cancroid, but from pruritus. Still, that cancroid may develop from such callosities a case reported by Mayer conclusively proves. The growth may spread deeply and extensively before it attacks the surface.

The ulceration begins by the loss of the superficial epithelial cells from the nodules. The nodules are then more readily recognized, and this is what speaks for cancroid. The carcinomatous ulcerations are characterized at the outset by the discoloration and elevation of the superficies of the skin, and by the livid borders. The secretion has a great tendency to become purulent. Where, however, as on the external genitals, there is no stagnation of the secretion, the ulcerations may spread extensively before the secretion becomes foul. In later stages the cancroid is characterized by its fissured base, whence papillæ often project. The ulceration then resembles a raspberry. The tumor soon, however, spreads and as-

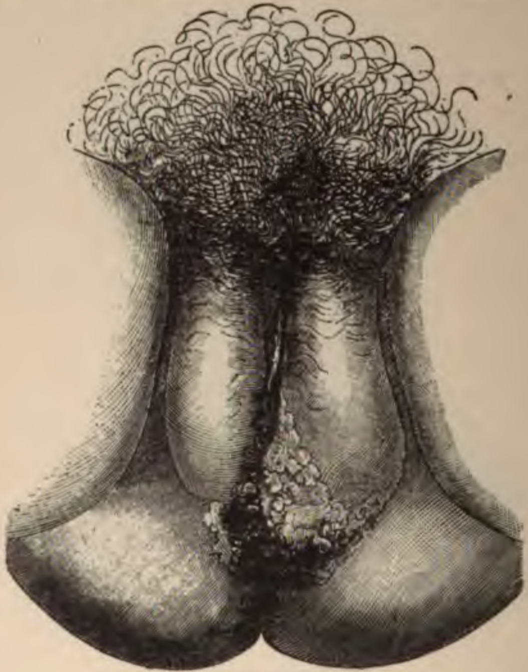


FIG. 69.—CANCROID.

sumes an oval shape, and has a marked tendency to spread, usually towards the mucous membrane of the vestibule. Hildebrandt remarked that a spreading of the ulcerated cancroid to the opposite labium majus ordinarily does not occur. He reports a personal case, however, where the probability was that such an extension had occurred. It concerned a cancroid of the left labium majus, which had the size of a twenty-five cent piece, while on the corresponding side of the right labium there existed a cancroid-like tumor the size of a cent, covered with thick granulations, and with indurated base. It was removed at the same time as the other, but microscopic examination did not prove it to be certainly a cancroid.

We have ourselves seen extension of a cancroid, and found in the removed tumor all the microscopic appearances of the disease. These observations are of the greatest interest, while they speak in favor of the local nature of the cancroid, although this very important fact has not been with certainty established. It is noteworthy, however, that cancroid of the external genitals seldom extends to the vagina, and that primary carcinoma of the vagina only rarely invades the vulva. (Mayer.)

Infiltration of the glands begins late in case of cancroid. This form of cancer remains local for a relatively long time. If the first chain of glands is affected, the changes in them react unfavorably on the ulceration of the labia. The labia swell more and the disease extends rapidly. The progress of the disease varies much. In certain cases the infiltration and ulceration spread from its starting-point on to the perineum and the thigh, in others the lymph-glands are speedily invaded, and infiltration and ulceration in the inguinal folds result.

Symptoms and Progress.—In the early stage the nodules may remain stationary without symptoms, and even without attracting attention. Generally for a long time the only symptom is pruritus. When ulceration occurs a new stage begins, characterized by rapid increase, and usually death follows within two years. When the ulcerative stage has set in, the course of the disease cannot be checked. Death occurs after long gradual sinking of the vital forces, the result of the pain, loss of sleep, lack of appetite from the disagreeable odors. Generally profuse hemorrhages, such as accompany cancroid of the uterus and the other carcinoma forms of the vulva, are here absent. The patients die of cachexia and of chronic septic infection.

As for the etiology of cancroid, we know very little of a certain nature. The only fact known is that its development in the later years of life is greater than is the case with cancer of other organs. But relatively few cases are met with in earlier life. According to L. Mayer's statistics, in 13 observations 7 women were between fifty and sixty years, 3 between thirty and forty, 2 between forty and fifty, and one between sixty and seventy. Hildebrandt's 3 cases were respectively fifty-three, fifty-six and sixty-two years of age.

Winckel's statistics are:

9.7	per cent	between	30	and	40	years.
25.8	"	"	41	"	50	"
32.2	"	"	51	"	60	"
25.8	"	"	61	"	70	"
6.5	"	"	71	"	85	"

West constitutes the only exception in regard to the influence of old age, in that he saw a case of cancroid of the vulva in a woman of thirty-one. In one of Winckel's cases cancroid developed from a wart of the clitoris, at the age of sixty-four. Heredity, for long believed to be influential as a factor, may be ruled out. Ordinarily the cancerous tumor is primary on one labium, and thence spreads. L. Mayer, however, has reported an instance where the disease existed concomitantly on both labia. As regards the influence of traumatism, in West's case, aged thirty-one, the cause was laid to a fall, five months previously, against a chair, followed by contusion and profuse hemorrhage. When West first saw the young woman the tumor was already deep enough to allow the placing of a nut in its cavity. It must be considered improbable that the disease may result from scratching of the genitals. That pruritus is ordinarily a concomitant of the disease, is proved by instances where the women have been examined at this stage, and a cancroidal nodule was detected.

Immediate excision of the nodules in an early stage not only leads to amelioration, but even to radical cure. The knife must be used, and the removal must be complete, the excision extending into sound tissue. Rokitansky uses the thermo-cautery. We do not think that this has any advantage over the knife, in regard to lessened hemorrhage, or, better, removal of all the diseased tissue, and therefore we do not favor it. Hemorrhage at the best is never so profuse that it cannot be checked, and therefore we favor the knife and consecutive suture of the wound. The patients, however, are usually seen too late. When the glands are affected, even though not suppurating, there is little ground for hope of radical cure, for even careful removal of each affected gland does not guarantee against recurrence.

On the labia, where it is possible to remove all of the tissue, this should be carefully done. After the excision of the cancroid with the knife, thermo-cautery or galvano-wire, the cancroid should be touched with fuming nitric acid. Two years ago I operated on a woman of seventy-five years of age, from whom nine years previously Schroeder had extirpated a cancroid of the right labium. In the spring of 1881 she noticed a nodule on the other labium, which had acquired considerable size before she was operated upon. In November, 1881, the disease had spread to the clitoris, and notwithstanding careful removal, she died three years thereafter of recurrence.

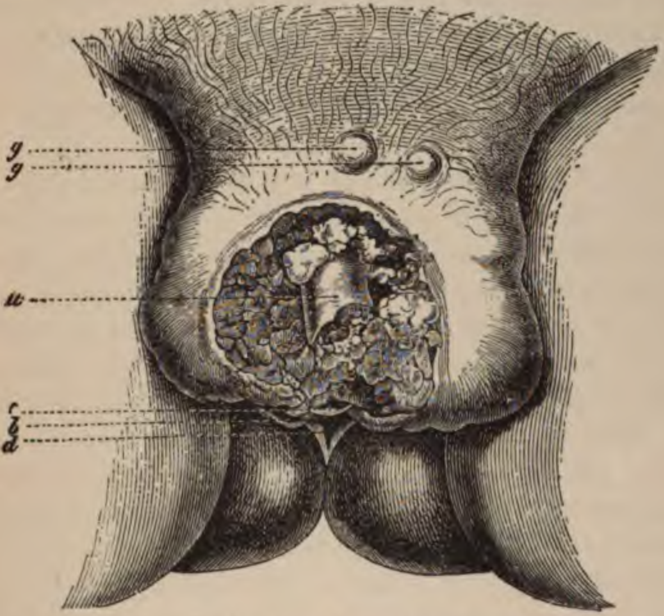


FIG. 70.—CANCROID. *a*, *c*, *b*, ulcerating cancroids; *d*, introitus; *g*, *g*, nodules.

Medullary carcinoma (*glandular cancer*), *scirrhus and sarcoma* are seen less frequently on the vulva than cancroid. Louis Mayer only saw four cases in his extensive practice, Hildebrandt three, Schroeder two, West one, and we have seen one. Of Mayer's four cases, two were scirrhus, two sarcomata, and Hildebrandt had two scirrhus and one sarcoma. Klob, Baily, and Prescot report instances of melanotic carcinoma of the vulva.

The primary seat is most frequently on one of the labia majora, and next on the clitoris. Mayer's two instances of scirrhus, developed from the clitoris or its prepuce, and his two cases of sarcoma, one from the nymphæ, and the other from a labium majus. Of Hildebrandt's two cases of scirrhus, one developed from the right labium majus, and thence extended to the labium minus and to the clitoris. The glands on both sides were much swollen, more so to the left than to the right; the other grew from the prepuce of the clitoris.

Scirrhus cancer begins ordinarily with deeper-seated nodules than the cancroids. In case it ulcerates, this occurs after extensive spreading. All the reported cases belong to women advanced in life. Mayer's and Hildebrandt's cases ranged between sixty and seventy years of age.

There are only a few cases of sarcoma of the vulva on record. The first of the instances recorded by L. Mayer concerned a woman in her sixtieth year, who had on both labia, the nymphæ and their neighborhood, eight to ten red, sponge-like excrescences springing from the cutis and varying in size from that of a pin's head to a hazel nut. These growths bled most readily, and this rapidly weakened the woman. In the second case there also existed profuse hemorrhage. The tumors when first seen were the size of a cherry, pediculated, and excoriated on the surface. On the opposite side of the vulva were dark pigmented markings. The growths were removed, and the base was cauterized with the red-hot iron. The patient remained healthy for five months. Then the growth recurred and death soon followed.

Hildebrandt's case was rather an instance of sarcoma of the meatus urinarius, a few instances of which are on record. The sarcoma developed in an old woman from carbuncles of the urethra, which had frequently been treated by the scissors and the cautery, and it spread to other portions of the external genitals. G. Simon, Kleeberg, and Winckel have also recorded instances. Winckel's first case had been diagnosticated lipoma of the clitoris, but microscopical examination proved it to be made up of round cells. The second tumor, springing from near the urethra, was a myxo-sarcoma, and the greater portion consisted of spindle cells.

Rhabdomyomata, such as are found developing from the vaginal wall, are not met with on the vulva.

The symptoms and the course of these varieties of cancer, are more severe than in case of cancroid. The nodules under the skin, in these cases as well, either give rise to no symptoms or else only to pruritus. There is also more profuse vaginal discharge. When once the parts ulcerate, however, there is more pain than in case of cancroids. The tissue, which is greatly infiltrated, breaks down extensively, and there is greater tendency to hemorrhage, even as in case of similar growths of the uterus. The lymphatic glands are earlier affected, and these degenerate and ulcerate speedily. The patients die relatively soon of cachexia and metastases.

The treatment consists in the removal of all the diseased tissue. In case of the rapidly spreading forms, however, where the glands are speedily affected, nothing but palliation is to be expected. Recurrence sets in in the cicatrix, and the laity are accustomed to say that operative interference has simply resulted in increase in the disease. Cures have been recorded, but we are always skeptical in case of reported cures, and are in doubt as to the real nature of the tumor. Hildebrandt says that he has operated in the early stage of scirrhus and medullary sarcoma without lasting effect. We are not dealing indeed with disease of the superficies, but with a carcinomatous infiltration of the entire wound.

The symptomatic treatment consists in allaying pain by narcotics, and overcoming the pus formation and the hemorrhage by antiseptic powder, iodoform, naphthalin, salicylic acid, etc., and by painting with iodine (diluted) or occasionally with the sub-sulphate of iron.

Tuberculosis of the external genitals, if we exclude lupus, I cannot find a single instance of. This is noteworthy, since Jarisch and Chiari have recorded a case of tuberculosis of the skin. It is, however, probable that lupus is a localized tuberculosis of the skin. In Cayla's recorded instance of tubercular ulceration of the external genitals, there were tubercles in the apices of the lungs and ulceration of the labia and vestibule. Many nodules were on the affected parts, which under the microscope presented the characteristics of lupus. (*Vide* Gehle, Dissertation on Primary Tuberculosis of the Internal Female Genitals, Heidelberg, 1881.)

CHAPTER XI.

DISEASES OF THE BARTHOLINIAN OR COWPER'S GLANDS.

THE terms Duverney's and Cowper's glands are synonymous, and the latter is preferable, since it is applicable to the analogous glands in the male. Huguier called these glands the vulvo-vaginal. As a rule Cowper's glands in the female have the size and the shape of a bean (about .7 of an inch long.) They lie with their long axis coincident with that of the labia majora, and are deep-seated. In thin women they may be felt in the lower part of the labia majora by grasping this part between the thumb and the fore-finger. The gland is about three quarters of an inch from the surface of the labium majus, and we must incise to this depth, in order to expose it. Generally, it is composed of one or more lobes, which extend into the muscular substance. These lobes are covered by the same cylinder epithelium as is its analogue in the male (Henle). The ducts of the glands converge towards the apex into the common duct, which is about three quarters of an inch long, and from .039 to .08 of an inch in width. The glands are surrounded by the muscular bundles of the bulbo-cavernosus which cover its external surface entirely, and only in part its inner surface (Henle). The duct admits the passage of a fine hypodermic needle point. It extends from the upper border of the gland at right angles to it, against the labium minus, is covered by the muscular fibres of the constrictor cunni, and opens in the vestibule in front of the hymen, about one inch from the mid-line. In women who have borne children, and where only the carunculæ myrtiformes remain, the opening of the duct is very easy to find, since it ordinarily lies to the outside of such a caruncle.

The glands secrete a grayish-white slimy mucus, and this is the fluid which moistens the genitals during copulation, and since the gland is surrounded by the fibres of the bulbo cavernosus, it is probable that ejaculation is caused by the contraction of this muscle. In these points these glands are again analogous to Cowper's glands, and not to the prostate of the male.

Disease of these glands is very frequent, and we believe that gonorrhœa is by far the most frequent cause.

Inflammation and Occlusion of the Duct.—The cause of occlusion is the same as holds for other ducts in the body. Any inflammation in the neighborhood of the duct and extension into it, leads to swelling of the mucous membrane and occlusion. As the result of vulvitis in particular, the gonorrhœal form of condylomata, which spread over the opening of the duct, there occurs swelling of the mucous membrane, and narrowing and obliteration of the duct. The tumors reach the size of a goose to a hen's egg, although they are not necessarily painful. They only interfere in sitting, standing, walking, and in copulation, and may from mechanical irritation become painful. Long retention leads necessarily to distension of the canals of the glands, but there is also present a widening of the duct itself, whereby the secretion may flow out. The distension is, of course, the source of discomfort, and the emptying gives great relief, but the occlusion of the duct speedily occurs again.

We have already given it as our opinion, that some inflammatory process must precede the development of these affections, that they cannot, in a word, occur as the result of some pure mechanical cause. It so happens that the inflammatory process is localized and then the duct is little affected or greatly so. Through extension of the inflammatory process the secretion becomes more or less purulent, and through partial occlusion of the duct or through its obliteration, there results a retention cyst of the Bartholinian gland. As a rule inflammation of the duct is the result of extension of gonorrhœal catarrh, and the hypersecretion may be due to a catarrh. Often cases of intractable and recurrent gonorrhœa is dependent on this duct, where the incarcerated secretion acts as a focus of regeneration of the gonorrhœal virus, and thus leads to recurrent attacks. This affection is seen at its best in prostitutes and kept women. From Breton's researches it has been proved that a gonorrhœa of long duration generally has its principal seat in this duct, and that from here the germ emanates. Zeissl is of the opinion that the disease remains in this duct long after the cure of a vaginal and a vulvar catarrh, and that the physician who is not aware of this fact may fall into decided error. The treatment, hence, must be directed toward preventing this retention, and therefore the causal factor of recurrence. The best means to this end is the injection of the duct with a solution of nitric acid through a small canula, the thickness of a Pravatz syringe. If the duct is not permeable to the syringe, puncture is of no utility, since the artificially made canal closes soon afterwards and retention of secretion again occurs. Far preferable to these injections is slitting of the duct with a small protected bistouri, such as ophthalmologists use for incision of the lachrymal duct. I have often done this with the best results. Through the small incision the cyst and its duct are packed with iodoform gauze. Much pressure

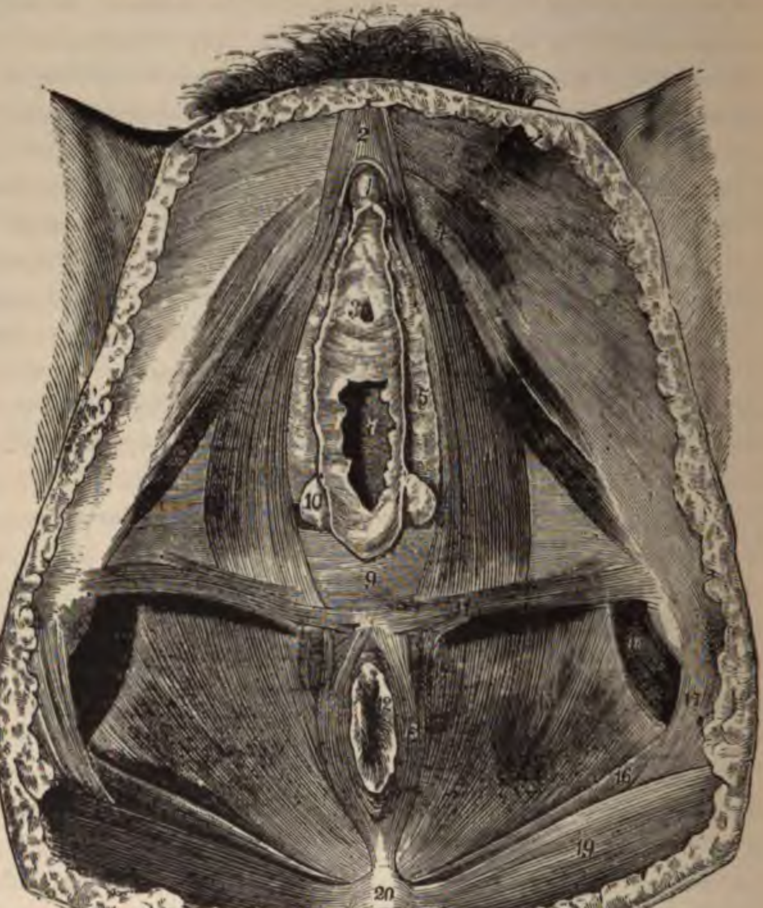


FIG. 71.—THE FEMALE PERINEUM. 10, vulvo-vaginal glands.

on the cyst from within outward should be avoided, lest it rupture and its contents become extravasated into the surrounding cellular tissue. The mouth of the duct is best found by pulling the labium apart with one hand, and then with the other hand or with dressing forceps pulling the remains of the hymen inwards towards the median line. Above the duct of Bartholin's gland lie two small mouths of mucous glands, which belong to the superficial mucous membrane, and these may lead to error.

Retention Cysts.—It is certainly possible that through occlusion of the main duct retention may occur, and an ever-increasing distension of the canals of the gland. For the formation of retention cysts, however, the chief cause must be occlusion of the separate lobules, since inflammation of the efferent duct is more likely to result in rupture and discharge of the accumulated secretion.

Certain retention cysts, according to Klob, are at the outset generally spindle-shaped, and later round. They are superficial, smooth-walled, unilocular cysts, in general containing clear mucoid matter. They occur also as dilatations of the efferent duct, and seldom are larger than a walnut. Huguier describes further a species of conglomerate cyst, which results from the occlusion of the common duct and dilatation of the nearest lobule.

Another form of retention cyst is also round, and developes from cystic degeneration of one or more of the acini. The contents are either serous, or colloid, varying in color from a clear yellow to a brown. The cysts which develop from the gland or its duct enlarge during menstruation, and may merge into abscesses. (Klob and Köbner.) It is questionable if where, as in Köbner's case, the contents of the cyst is fatty, and with chalky deposits in the walls, it is not more correct to consider it a dermoid rather than a cyst formed from Cowper's gland.

Höning has described a peculiarly interesting case, of which there is only one other instance to be found in literature. At the outset the patient had an imperforate hymen which was opened for the relief of retention of the menses. She then became chlorotic and ceased to menstruate. At twenty-three years of age the menses returned with dysmenorrhea. At thirty-six years of age the patient again sought advice on account of a tumor of a labium which was found to spread up the vagina, and pushing up the cervix. It could be felt through the abdominal wall. The diagnosis of vagina duplex with retention of blood was made. Incision, however, gave exit to a thick, gray-white, fatty material, and the tumor was proved to be a retention cyst of Bartholin's gland which had extended up the vagina. It appeared then as if the atresia of the hymen and the occlusion of the duct of the gland had occurred at the same time in early childhood. The only other similar case which has been recorded is that of Boys de Lourq. (*Sur les cystes et les abscès des grandes lèvres. Revue Medicale,* IV. 1840.) The differential diagnosis between hæmatokolpos and a dissecting cyst of this nature may be made by the fact that pressure on the cyst in the vagina will not result in its appearing beyond the dividing line between the vagina and the vestibule in case it is a hæmatokolpos, whilst in case of cyst of the gland pressure will force the contents down into the labium majus.

Huguier stated that such cysts might develop upwards in the space between the pelvis, vagina, and rectum, but an instance of this nature has never been recorded. As regards the symptoms, it is noteworthy that in Höning's case the incision and excision of a portion of the cyst wall caused the disappearance of dysmenorrhœa which had lasted for years. He thence claimed that the menstrual hyperæmia caused each time an increased tension of the cyst.

The treatment of these cysts is only radical when they are entirely extirpated. In the case of other retention cysts, we know how frequent recurrence is after excision, unless adhesive union is obtained. We should remember, however, that in instances like those of Hōning and Boys de Lourq, extirpation has its risks from the liability of wounding neighboring organs. In case of small cysts, however, extirpation is indicated, and is not difficult even where union has occurred with the surrounding cellular tissue. When I refer to abscess of Cowper's glands, the result of interstitial inflammation, I will speak further of the method of extirpation.

When from some cause or other the entire gland cannot be removed, then after incision we must endeavor to pass a probe from outwards through the duct, since otherwise recurrence will unquestionably obtain if we cannot cause union of the walls of the cyst. To cause such adhesion the best plan is to fill the cavity with cotton dipped in tincture of iodine or covered with iodoform.

The Bartholinian gland may also inflame, aside from retention of its secretion and without extension of the inflammation through the duct.

Such an inflammation is the result of phlegmonous processes in the neighboring cellular tissue. The symptoms are much more marked than in case of inflammation of a retention cyst, seeing that the pain extends to the ischia, the pubes, and the thighs, torments the patient and results in constitutional disturbance. The inflammation which has invaded the surrounding cellular tissue, the intralobular tissue, and the individual lobules, rapidly becomes purulent, and the labium increases greatly in size, I have seen it the size of a goose-egg, and this is accompanied by pain and tension in the neighborhood. After a certain period there occurs rupture, and usually on the inner side, the mucous membrane, where the gland lies nearest the surface. The discharge ordinarily consists of foul, discolored pus, which is mixed with the secretion and in consequence is thick. In case of more than one abscess there are a number of rupture sites with separate fistulous tracts communicating one with another. After cure, hence, there are a number of cicatricial depressions.

Seeing that occasionally condylomata develop from the base of the tumor, and it is very difficult to treat them effectively, the question arises as to whether gonorrhœa does not play a part in these affections. Recurrence is very frequent, even as is the case with other lobular glands, the mammæ for instance. The result is that patients who object to excision are subject to having an abscess every four weeks.

The diagnosis is not difficult and need only be made from ordinary abscesses of the labia majora. Hæmatoma is to be differentiated by its bluish color and the absence of pain, and hernia by the tympanitic percussion note.

The treatment is at the outset an antiphlogistic one, and as soon as an abscess forms it is to be freely laid open and its cavity packed with iodoform gauze. Simple incision will only exceptionally suffice, in case of the existence of only one cavity, for instance; but where there exist a number of small abscesses even the iodoform packing may not answer. In case of recurrence the entire gland must be cut out. We have had a case of the kind: A young widow, who at her last confinement had been very ill, came to me with abscesses in both the labia. She had not had painful micturition, but during her last pregnancy had suffered from a profuse discharge accompanied by great burning of the external genitals. A year afterwards the abscesses appeared. The first and largest was on the left labium. It was incised and very foul pus let out. When the cyst refilled excision was advised, but she refused. There were numerous recurrent attacks, and she married again. She became pregnant, and every four weeks an abscess formed and ruptured, first on one labium and then on the other. About the seventh month of gestation, she finally insisted on an operation for radical cure, even at the risk of inducing premature labor. The operation was performed, but union by first intention did not occur. The pregnancy was not interrupted. Since then I have on two occasions extirpated the glands with good results. In neither instance was anything definite in regard to etiology obtained.

CHAPTER XII.

LACERATIONS OF THE PERINEUM.

ASIDE from labor, lacerations of the perineum may occur through accidents of various kinds. It usually results from blows of the external genital organs against hard, sharp objects. There are many instances of the kind on record. Hildebrandt speaks of a rupture of the perineum following a fall on the leg of a stool, with such force, indeed, as to break the object; of a case of a little girl who in sliding down the balusters, ruptured her perineum against the newel post We had a patient in our ward who deeply lacerated the perineum and the recto-vaginal wall, as the result of a fall against a vine-prop. It occasionally happens that the perineum is lacerated during operative procedures for the removal of a polyp or the remnants from a miscarriage. These instances, however, are great rarities when compared with laceration, the result of parturition.

The most frequent cause of laceration during labor is the sudden birth of the fœtal head. The introitus vaginæ is frequently so narrow in a young nullipara, that there is scarcely room enough for the insertion of a single finger. It is wonderful how such a narrow introitus will distend under the pressure of the fœtal head. If the birth of the head occurs slowly and in normal relations, then the perineum may be uninjured. If, however, at a critical moment, there is downward pressure or hasty manœuvre then laceration is likely to occur. Even where the fœtal head is small the perineum may be ruptured by intense bearing-down or pressure, while a larger head under judicious management may be delivered without injury.

We are not concerned here with the details of the methods for the prevention of laceration, but it is necessary to state the principles on which they are based.

When we consider what is necessary for the protection of the peri neum during labor, we see that it lies in recourse to timely measures. The child must pass over this narrow route in order to be born, and this may happen without injury when it occurs slow enough. The first and most important measure for securing proper relaxation we have already spoken of: slow birth of the greatest circumference of the head, and the second is delivery by the smallest diameters of the head, which of course varies with the position, and the third is the preservation of distensibility as far as this is in our power. Finally, and only very exceptionally, we note the enlargement of the introitus by lateral incisions in order to forestal laceration.

To secure the first aim the various means of prevention in use are of value. They consist in holding back the head at the critical time, and in pressing it forwards against the symphysis. Thus the elasticity of the perineum is retained, and it is enabled to relax. In case a broad ligamentum arcuatum present forward pushing of the head, it must be stretched or incised.

The so-called Ritgen's method, which consists in fixing the head of the child by a finger in the rectum, and which also extends it gently during the intervals of the pains, succeeds in securing slow delivery of the head in many cas

As for the second desideratum, the birth of the head by its favorable diameters, the following points are to be noted: In case of occipital positions the diameter of the head engages, which is included between a line extending from the linea nuchæ and one or the other frontal protuberance; or rather, since the head generally lies a trifle oblique, a line extending from one side of the linea nuchæ to the opposite frontal protuberance. It is often erroneously believed that in other positions, that is to say, in brow and face, the engagement is not so favorable. Such is not, however, the case. In brow presentations that diameter engages which extends from a point midway between the large fontanelle and the middle of the forehead, and the occipital protuberance. In deep engagement the diameter lies between the top of the forehead and the linea nuchæ, so that in this instance engagement does not take place by a greater circumference than in the former, and the risk to the perineum is not at all greater. In case of face presentations, the conditions are still more favorable than in case of vertex. The engaging circumference is not at all greater than in case of occipital and brow presentations. Indeed it is often noted that exit of the head in face presentations is rather easy and quick than slow and difficult. In case of the after-coming head, the same diameters engage at the vulva as in case of occipital presentations.

As for the third point, the distensibility of the perineum, it is of much importance. Care must be taken lest the compression of the hand against the perineum injure it more than excessive distension. The steady pressure of the hand makes the skin bloodless and fragile. Further the distensibility depends directly on the greater or the less elasticity. This diminishes with age. We notice that the perinea of old primiparæ soon lose their elasticity, a loss which can only be taken account of at the time of labor. Statistics show in such women a somewhat relatively longer duration of labor, and a greater frequency of resort to the forceps, and the cause lies at the external genitals. Hecker has found that women who bear their first child after the age of thirty (other authorities place it at thirty-five) suffer laceration of the perineum in 14 per cent. of the cases, while the mean is only 3.66 per cent. The lack of distensibility of the vulva will of course be the greater when cicatrices from one or another source exist in the labia. Condylomata, varices, and the like, hinder uniform distension, and render rupture a much more dangerous affair. Great œdema, on the other hand, interferes little or not at all with dilatation. Ruptures in general are very frequent, but exact data are not easy to give, since opinions vary in regard to the extent of a rent, which should be called a rupture. The great variations in the statistics prove this. Schröder found laceration in 34½ per cent. primiparæ, and in 9 per cent. multiparæ. Winckel noted 11.5 per cent., Olshausen 21 per cent. in case of primiparæ, and 4.7 per cent. for multiparæ, which Hildebrandt states as 7.2 per cent. and Hecker as 3.66 per cent.

Very infrequently other conditions favor laceration of the perineum, for example, a deep symphysis, a broad ligamentum arcuatum, deficient pelvic inclination. In each instance the head is pressed more backwards, and this prevents its proper engagement under the symphysis.

On the proper conduct of the labor depends greatly the integrity of the perineum. It is a matter of experience in clinics, that at the beginning of the session lacerations of the perineum are much more frequent, because beginners conduct the labors, and that such lacerations rarely occur when the delivery is under the personal supervision of the clinical assistants.

Since lacerations of the perineum are of variable import, it is customary to divide them into degrees, which, however, are purely artificial. Lacerations to the first degree do not extend to the anus, but within a few centimetres of it (about half an inch). Those to the second degree extend to the sphincter ani, and those to the third degree through it. The more extensive lacerations extend a half an inch or so up the rectum itself. In order to make these degrees clearer, Liebmann states the lengths of the tears in centimetres, varying from 1 to 4 ctm. (from .39 to 1.5 inches). It is apparent, however, that the only proper comparison is between the original length and that of the tear. The measurements should be taken with the woman in the lateral position.

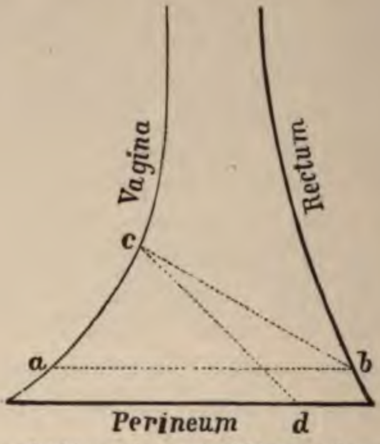


FIG. 72.—*cd* represents a superficial tear; *ab*, a superficial between the second and the third degrees; *cd*, a deeper first, and *cb* a deeper third degree. (After *Spiegelberg*).

There are women in whom so many predisposing factors are present, that even the most watchful accoucheur cannot prevent laceration. Those lacerations which occur during spontaneous delivery, where there is excessive distension and diminished elasticity extend, generally to the sphincter ani. Lacerations to the third degree ordinarily occur during operative interference. In case of operative manœuvres, it is right to lay the greatest possible stress on watching the perineum, since all resulting lacerations are the result of very extensive stretching.

Lacerations of the first degree affect only the anterior part of the perineum, including the fourchette and the external skin. The constrictor cunni muscle is generally torn at the same time. This may remain intact, however, if the rent is superficial and only the distended skin is torn. Even in case of a laceration extending to the anus, the skin may alone be torn, this constituting a superficial tear to the second degree. As a rule, however, the underlying tissue is also torn, and the rupture extends as high up into the vaginal wall as it does backward into the perineum. If in a recently delivered woman the labia are pulled apart, the torn surfaces present the appearance of two triangles, one side of which is the torn perineal skin, the second side the vaginal mucous membrane, and the third side, the bottom of the rent, is common to both. This applies, of course, only to lacerations of the lesser degrees, which involve the skin, the fascia, and the anterior part of the perineal muscles. The complete ruptures or those to the third degree invade the skin, the superficial fascia, the constrictor cunni, the superficial and the deep transversus perinei, the sphincter ani, and, to a greater or less degree, the recto-vaginal septum. According to Hegar's measurements, the rent ordinarily does not extend beyond one half to three-quarters of an inch, exceptionally one and a half inches up the rectal wall. The rent in the vagina is frequently greater. It extends not along the mid-line, since the columnæ rugarum are very resistant, but always to one or another side. It may extend both to the right and to the left, and surround the columnæ like the tines of a fork. As a rule each tear begins at the posterior commissure. In case of forceps operations the tips of the instrument may start the laceration higher up, before it is seen at the posterior commissure. Externally also the rent may deviate from the mid-line and extend toward a tuberosity of the ischium, or spread out forked-fashion in front of the anus. The worst and fortunately the least frequent lacerations are the so-called central ruptures of the perineum. When the head extends unhindered, it passes over the centre of the perineum. Lessened inclination of the pelvis or deep-set pubic symphysis interferes with this normal method. In case the pressure on the perineum is great and the distension marked, the perineum may burst, and the external skin first. The rupture site extends forward and backward and the head appears at the centre of the tear. Ordinarily it then happens that the rent becomes complete, but there are many reported instances where the child was born through the central rupture without tear of the commissure, such as the cases of Elsässer, Grenser, Stadfelt, Harley, Leopold, Simpson, Birnbaum, Kroner, Liebmann and others. In one case Winckel saw central rupture follow rapid œdema, and in the puerperium gangrene set in.

The immediate sequelæ of laceration of the perineum are in general more serious than they are thought to be. Rarely is there profuse hemorrhage. Hildebrandt relates a personal case where there was profuse venous hemorrhage, and I once saw in a case of complete rupture a fairly profuse hemorrhage from spouting artery, which required a deep suture. Every tear bodes ill to the puerpera during the lying-in period. I have seen high fever in puerperæ with lacerated perinea, as was to be expected, since the rents are bathed by the lochia. The more the perineum and the vagina are bruised during labor, the greater the liability to gangrene, which may result in general sepsis. Frl. Vögtlin found in Winckel's service at Dresden that 68.5 per cent. of puerpera with lacerations had exudations during the puerperium. Hildebrandt relates instances where the gangrenous perineum was the starting-point of pyemia. Too many and too tightly tied sutures may also lead to gangrene from interference with the blood supply and the nutrition of the parts.

If then it be granted that the course of the puerperium may be disturbed by the presence of these lacerations, then should every rent be repaired and every injury in the vestibule carefully watched. If the first part of the puerperal period has passed by, and the laceration is granulating or has cicatrized, then the danger of infection has passed, but the secondary symptoms supervene. As long as the cicatrix lasts many women complain of burning and pain on micturition, as well as in sitting, standing, and walking. In general, the vast majority of women with a cicatrized perineal rent, provided it be not extensive enough to cause incontinence of fæces, complain of nothing beyond the above-mentioned symptoms. Yet it may be the source of painful sensations, even as we see result from the cicatrix following the incisions made to prevent lacerations of the perineum. At this site there may be present a burning sensation or an itching, calling for scratching or slight scalding on micturition. The lack of closure of the rima vulvæ is noticeable after the lapse of some time in all women. The patients complain of dragging sensations, and there exists hypersecretion from the vagina. On inspection we find the rima pudendi gaping posteriorly, and the anterior vaginal wall sags a trifle.

In case of complete rupture these symptoms are much intensified, and added to them is incontinence of fæces. Except in the extreme degree, there is ability to retain solid fæces, but loose passages and flatus are not under control. This circumstance renders most women very despondent, although there are some who do not mind it, either women very much afraid of an operation or else filthy in their habits. When, however, there is superadded incontinence of urine the conditions are scarcely bearable. This incontinence results possibly from a paralysis of the sphincter vesicæ, the outcome of long and great pressure during labor. That it is due to rupture of the constrictor cunni, as is claimed by Hildebrandt, I do not consider probable.

The great proportion of women with lacerated perinea are in a state of mental depression. To use Dieffenbach's expression, "Women with lacerated perineums are ashamed of themselves even as are women who have been castrated." It is more likely that this depression is the reflex result from the tenderness of the parts and the impossibility of keeping them clean. It is likely too that in certain cases, as Dieffenbach has suggested, it is due to loss of sexual appetite.

In case the rent has healed, then the triangular surfaces we have spoken of in case of the recent rent have spread apart and become covered with epithelium. The spreading apart is the work of the transversus perinei. The mucous membrane of the anterior rectal wall is drawn downward, that of the posterior is seen often between the cicatrized borders red as a strawberry. The sub-involuted vagina and the rectocele hang down over the cicatrized parts. The anterior vaginal wall loses its support and hangs down into the introitus.

Although such prolapse of the vaginal walls may follow on laceration of the perineum, in previously healthy women it is not necessarily accompanied by descent of the uterus, particularly if the women are stout or not obliged to work hard. Hegar and others think that too much stress has been laid on the likelihood of laceration of the perineum causing descensus uteri.

Lacerations of the perineum only exceptionally heal spontaneously during the lying-in period, and then only those of the first degree where the injury to the muscular layer has not been extensive. During the healing process the bottom of the wound fills up with granulations and there union begins. The non-united rent gapes apart during the puerperium, and at the end of six weeks seems much more extensive than it did at the outset. Central ruptures with intact commissure usually heal by second intention, because the apices of the rent are in contact and during the process of involution the granulations are close together. Complete lacerations with rupture of sphincter ani have no tendency towards spontaneous union or only fill up partially with granulations. A single example of spontaneous union has been recorded by Peu, but Lamotte states that thirty years later he saw the same woman with a ruptured perineum.

The prevention of laceration is the business of the accoucheur. We have already stated the principles on which this depends, and now we pass to a consideration of the treatment of the rent.

From what we have stated it is evident that the rule should be to repair every laceration. Although exceptionally union may occur spontaneously in case of slight rupture, we are never certain in any given case that this will happen. We are never in a position to say after delivery whether a laceration will heal spontaneously or not. Our rule should be not to await or expect spontaneous healing. The question now arises, at what time is it best to take operative steps to secure reunion? That union is always to be aimed at, I have already laid stress upon, and it is self-evident that the best time to secure this is immediately after delivery. The more speedily then the lacerated edges are brought in contact, the more likely is union to occur. The next question that arises is, how long after delivery is suture likely to be followed by union? There are many reasons why immediate suture is often out of the question, the chief of which is that the labor is frequently conducted by the midwife, and it is some hours before the physician can see the patient. We should never wait longer than twelve to sixteen hours. After this period the lacerated edges have become more or less seared over, and we cannot expect union except after renewed freshening of these edges, which is painful and a source of disturbance to the recently delivered woman, who has already been through sufficient trial and desires rest. Still, after this early denudation the rent heals better, and the woman's chances of after-health are much increased. There are very few women who will refuse from mere caprice to have the rent repaired at this time. It is our duty, however, in any event to overcome all reluctance, and to insist on performing the operation.

Complete ruptures must absolutely be at once sutured. These lacerations are of such grave import, and the secondary operation so difficult, that it should be considered culpable neglect if the primary operation is not performed. If more than sixteen hours has elapsed since the receipt of the injury before the physician sees it, then union by first intention is not to be expected. In case of incomplete rupture, union by second intention may still take place by agglutination of the opposed granulations. It is questionable if this may not result from careful bringing together of the granulating surfaces. On this point authorities differ. Holst has sutured the granulating rent on the fifth to the sixth day, and Legros on the 13th *post-partum*, without good result. Hildebrandt also saw union occur on the tenth day, yet he claims that such instances are exceptional, and herein he agrees with Hegar. The only possible objection to immediate suture is the fact that infection of the patient may occur through the suture tract. We as yet do not possess a method of obtaining union which is not open to this charge. The superficial bringing together of the wounded surfaces by means of serres-fines, is not a certain method. Plasters cannot be used on the perineum, as they may on other portions of the body, for of whatever substance they are made, as they become impregnated with blood and lochia, they no longer compress the perineum firmly. In case of suture during the later days of the puerperium, the danger of infection no longer exists. If the denuded edges are well disinfected by carbolic or sublimate, and carefully wiped with clean cotton, then clean instruments and clean silk cannot infect, and ordinarily union will take place. To sprinkle iodoform between the edges of the wound, as is advocated by Behm, is not necessary, and has even in one instance where too much was used prevented union.

The advantage of operating in the late puerperium is that the patient will be cured of her lesion at a time when she must still rest. We must not expect to restore the parts to the condition they were in previously. The vagina will never be made as narrow as it was. The physician need not stop to determine what he ought to denude, since only the granulation surface is to be disturbed, and only the denuded part will grow together. After much personal experience we recommend this tardy suture of the perineum. The time of election depends on the state of the granulations. These must have cleaned off well, all jagged shreds must have disappeared, and the superficies must have the appearance peculiar to healthy granulations before we should think of suturing. This time is about the eighth day of the puerperium. Chloroform should be administered, and the technique of the operation is similar to that of the perineal suture in general.

Treatment.—Up to the present it has been the general custom to use the suture with its various modifications for the repair of the lacerated perineum, or else the serres-fines of Vidal des Cassis. In regard to the latter, however, it should be stated that they only bring the skin together, and that hence they are only suitable for superficial rents. A deep laceration must be sutured in order to obtain complete union. The serres-fines, also, when they are left for some time, penetrate the skin, and they must be frequently changed. Were sufficient adaptation obtainable to promise union, then they would be of great advantage in case of simple lacerations, and fewer ruptures would be allowed to go unrepaired and unhealed, for the great obstacle in the way of general use of the suture is the pain which it causes. With the serres-fines this objection is not entirely done away with, however, for although their application gives rise to less pain than the passage of a needle, yet the latter is far preferable in that the serres-fines must be frequently changed. Since now the vaginal sutures do not cause so much pain as those externally, it has been suggested that we may attain union of even deep lacerations with certainty by passing a number of deep vaginal sutures to bring together the muscles, and that serres-fines be used externally to hold the surfaces of the external rent together. I have used this method on three occasions and twice obtained an excellent result, as well as spared the patients much pain. The use of the serres-fines is so simple that Valenta favors giving them into the hands of midwives.

For the purposes of the suture, the following have been used: 1. The simple suture of silk, catgut or the like. 2. The furrier's or running suture. 3. The silver suture. 4. The hare-lip suture. 5. The quill suture. The simple suture of silk is the oldest, best and most readily used. Catgut cannot be used on the perineum, for the reason that it is absorbed too quickly, and union is often retarded by suppuration. It is recommended by Hildebrandt for the vaginal sutures. It is noted that where silk is used there is generally in a few days some discharge with fetor, although the patient has no fever, still I have never seen unfavorable results. I have used boiled silk, but notwithstanding have noted the fetor.

The silver suture has much to recommend it. The sutures may be left longer without their cutting through or leading to purulent discharge, for they do not absorb. Wire has the disadvantage, however, of requiring to be twisted or shotted. I prefer the latter to the twisting, since it requires no special instruments as twisting does, and it holds longer than knotted silk. The other suture methods, which are all in principle more or less like the quill suture (Balkennaht), are all good, since they hold the edges well together if superficial sutures are superadded.

The best position for the woman for the primary operation in case of incomplete rupture is on the side, especially for the general practitioner, who must repair the lesion without an assistant. Any one may hold up the buttock so that the physician may see the lacerated surfaces. A large greatly curved needle is then to be passed through both wounded surfaces, and the suture is thus drawn through and tied. Care must be taken to bring the vaginal mucous membrane well together, and to accomplish this it may be necessary to insert some superficial sutures, which is best done with the patient in the dorsal position.

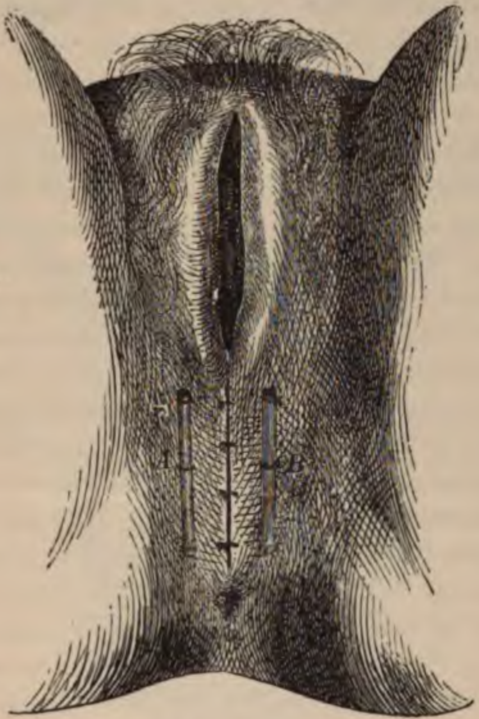


FIG. 73.—THE QUILL SUTURE.

In the primary repair of a complete laceration, the woman should lie across the bed, since it is necessary to obtain exact apposition of both the vaginal and the rectal mucous membrane, lest there remain a recto-vaginal fistula. To obtain a good view of the vaginal rent, it is essential that the wounded surfaces should be pulled well apart, and this is only possible in the dorsal position. In order that the entire wounded surface should be united, it is necessary to bring the parts as exactly together as they were before the receipt of the injury. To pass all the sutures first, as Hildebrandt recommends, and then by drawing them together to satisfy ourselves that there will be exact apposition is the best way to obtain thorough union. But this method is not so convenient on account of the liability of the separate sutures becoming tangled. We recommend first to place the rectal sutures and to tie them. Particular attention must be paid to the careful adaptation of the edges of the rent at the upper angle and at the anus, and the remaining sutures are to be passed deeply, so as to catch up the muscles. The after-treatment of the primary operation, consists in frequent douching of the vagina, and the application of iodoform gauze. In case of pain, the local application of compresses wet in a weak solution of tincture of opium is the best. We have latterly used iodoform collodion a great deal, and can recommend it highly. It is composed of 15 to 30 grains of iodoform to two and a half drachms of elastic collodion. Immediately after suture this is painted over the surface, and gives us an antiseptic occlusion bandage. It burns a trifle, but it does not interfere at all with the healing process. We formerly used the balsam of Peru, but while it is a good antiseptic, it burns for a longer time than does the iodoform collodion. It is not essential to tie the legs together; on the contrary, it may prove harmful by causing retention of secretion. Only when the thighs are markedly stretched apart is sufficient traction made on the perineum to endanger the sutures. Kehrer has by measurement determined that sixteen inches is the allowable limit of separation of the thighs. Rest in bed is the only additional necessary precautionary measure. The material used for suture must, in case of the primary operation, be either disinfected silk or wire, never catgut, since it is absorbed too quickly.

The secondary operation in case of incomplete rupture may be performed at any time with hopes of good result. In case of complete laceration, however, the hope of cure is less the longer the patient defers the operation, since the muscles, the sphincter ani and the transversus perinei, retract the more and undergo fatty degeneration. The time usually chosen for operation, six weeks after delivery, has been found too early by Hildebrandt, because the soft parts are still very hyperæmic and bleed more during denudation. He advocates with reason waiting till after the first menstrual period, since this time marks the return of the genitals to the normal. This is sound advice, because the secretion accompanying defective involution may interfere with union. Hyperæmia is not to be feared, since under it the wounds heal better. We will de-

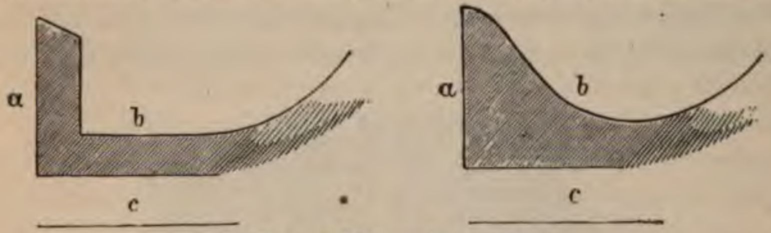


FIG. 74.—*a*, raphé; *b*, vagina; *c*, rectum.

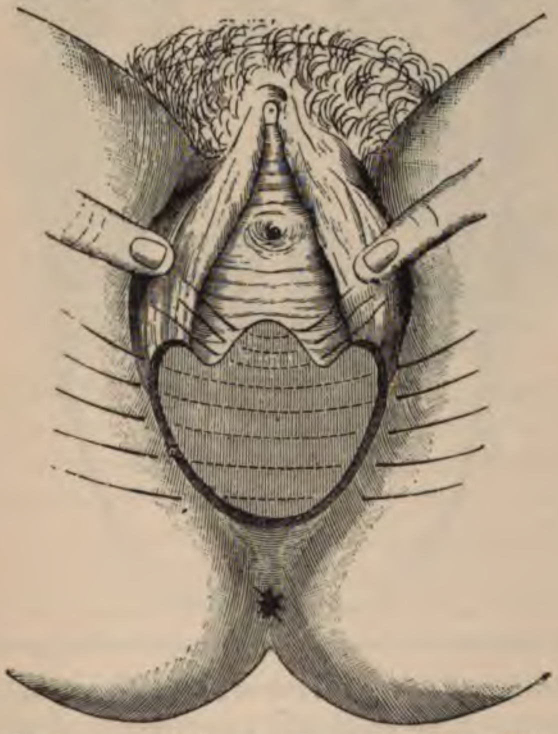


FIG. 75.—DENUDATION AND SUTURE IN CASE OF INCOMPLETE LACERATION.

scribe, as typical, the operation where the rectal wall is still intact. At the time of rupture, there exist two triangular surfaces. If these are not interfered with, they spread apart, and in the course of a few weeks become covered over with mucous membrane, constituting the cicatrized laceration of the perineum. To denude these surfaces and to bring them into contact by suture, such is the aim of the operation. In order to obtain a broad perineum, the denudation must extend not alone over a small part of cicatrized surface, but also into the vagina. Superficial denudation will only result in building up a wall of skin in front of the vagina, and the conditions existing previous to rupture will not be secured. There results what is schematically shown in Fig. 74, *a*, and not the lift-

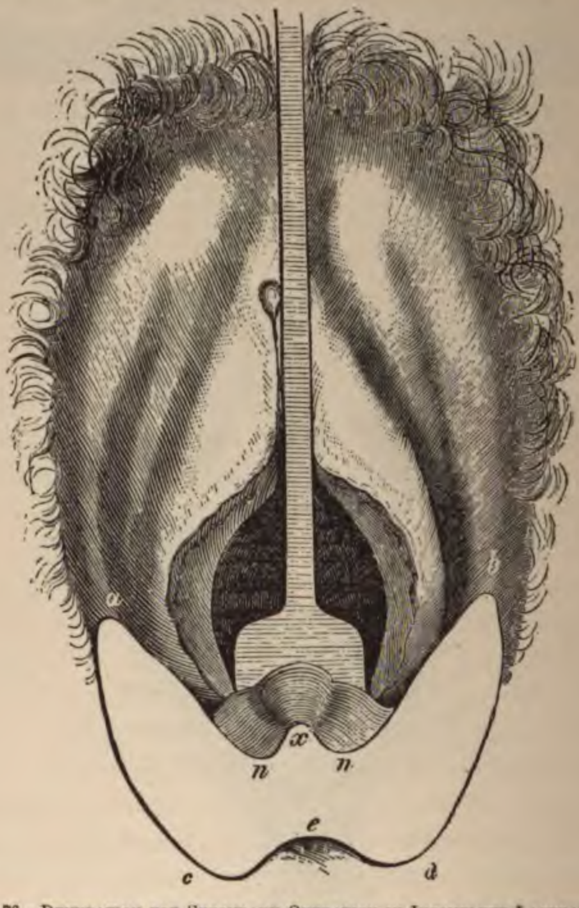


FIG. 76.—DENUDATION FOR SECONDARY OPERATION IN INCOMPLETE LACERATION.

ing up or building up of the perineum, which is represented in Fig. 74, *b*. The simplest method of denudation in case of rupture to the first degree is shown in Fig. 75. The more, however, the rent extends backwards, the higher must the denudation be carried up into the vagina, and there results the appearance shown in Fig. 76, where the curved line *a, c, e, b, d,* extends from the top of the old posterior commissure at the junction of the skin and mucous membrane, around in front of the anus to a corresponding point on the opposite side. The angle *nx* extends above the apex of the rupture upwards into the vagina. The sutures first bring together the vaginal denuded surfaces and then the perineum, the needles here being passed as deeply as possible. We recommend in these instances very highly the quill suture shown in Fig. 73. By means of it we prevent with certainty pocketing in the centre of the wound, and the resulting retention of secretion and pus formation which nullifies the result. The operation in case of laceration of the perineum to the first and second degree, is very simple and successful. The result is apt to be the better the more carefully we attend to antiseptic rules.

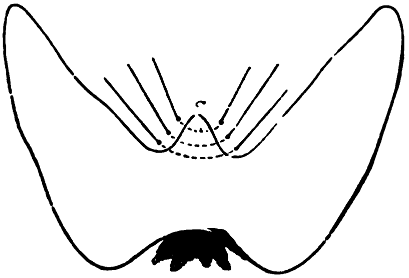


FIG. 77.

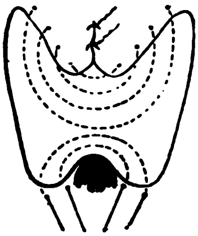


FIG. 78.

The operation for complete rupture of the perineum is far less likely to succeed than the preceding. The rent in the rectum must also be repaired. The disturbance by the passage of fæces over the denuded surfaces, which have been brought together, is very likely to make the operation a failure. On this account constipation has been induced, but it has been found practically that the resulting hard scybala were also likely to separate the united surfaces at the first evacuation. Fæcal evacuations should be limited to the minimum, the intestines being thoroughly cleansed for a week before the operation, and then by means of a fluid readily assimilated diet the formation of scybala is prevented. The bowels, however, should not be constipated, but rather kept fluid through the administration of a gentle laxative during the after-period.

The denudation differs according to the operative method resorted to. We will at the outset describe Simon's method, to which he has given the name of the triangular denudation. The denuded surface is only slightly different from that which we have described in case of incomplete laceration. The rectal denudation is the only additional part. In case of extensive rupture, in order to obtain symmetrical denudation it is of advantage first to outline by the knife the surface to be removed. In the process of denudation we are likely to cut the large perineal veins, but the hemorrhage is rarely profuse, and compression by means of one finger in the rectum, and another in the vagina, will check it. The denuded surfaces are to be trimmed off with the scissors, and then the sutures are to be passed.

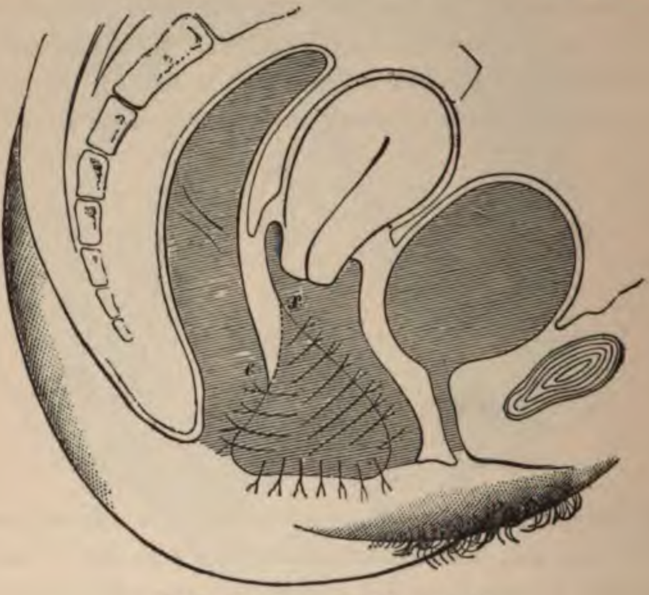


FIG. 79.—(After *Hegar and Kaltenbach.*)

Three sets of sutures must be used, the rectal, the vaginal, the perineal. The deep sutures should only be inserted from the vagina. If passed from the rectum they would have to be taken out, else, if left above, they will cause suppuration, tear through and result in recto-vaginal fistula. This may, however, be prevented through the use of catgut. The great point is to bring the denuded surfaces well together by suture, and to operate on strict antiseptic principles. It is especially essential that all hemorrhage be checked before passing the sutures. Hegar and Kaltenbach, who have adopted Simon's triangular denudation, pass the chief series of sutures from the vagina. For the rectum they use carbolized silk or catgut. The sutures in the recto-vaginal septum, they pass from the vagina, and they leave them *in situ* for from four to six weeks. In case silk has been used in the rectum, it must also be removed at this time, if it has not already spontaneously torn out.

Hildebrandt differs from the method of Hegar and of Kaltenbach in that he passes all his sutures before he begins to tie them, and in the second place in that he passes the perineal sutures deeply and under a wide extent of surface. In Fig. 80 the application of the sutures is shown, and in Fig. 81 the manner in which they lie when tied. This method has the disadvantage of causing more hemorrhage, and in that the deeply passed sutures readily dissolve higher up, and there is likelihood, hence, of resulting recto-vaginal fistula. Reference to Fig. 81 will show the further disadvantage that equal traction on the sutures from the three sides leaves a pocket in between.

In my own operation in case of complete rupture, I first pull the rectal mucous membrane upwards, and often it may be drawn forward greatly, so as to slope over the cicatricial border of the vaginal mucous membrane. The drawing forward is very necessary in order to obtain a symmetrical broad denuded surface throughout the whole extent. I next mark off the lower margin of the denuded surface at the anus. I then transfix with a knife the free border of the vaginal and rectal wall above, and denude the recto-vaginal septum on each side. The cicatricial tissue in the vagina is then cut out, and the denudation extended up the vagina, and down along the margin of what is to constitute the new posterior commissure. I lift up the mucous membrane with forceps, and skin it off in broad strips by means of a knife even as the skin is peeled from an apple. In this way the entire mucous membrane is removed in a few minutes, although unevenly. The little undenuded portions are to be carefully trimmed off with Cooper's scissors under irrigation with carbolic solution. The sutures are next passed, and first the rectal, which are passed through the mucous membrane and knotted in the rectum, the entire rectal wall being sutured before the vaginal sutures are passed.

The rectal sutures are of catgut, but for the vaginal I have used both silver and silk, generally the latter. Before the first vaginal suture is tied, the denuded surface should be carefully disinfected with a weak 5 per cent. solution of zinc chloride. The vaginal sutures include the recto-vaginal septum, or else, guided by the finger to protect the rectal

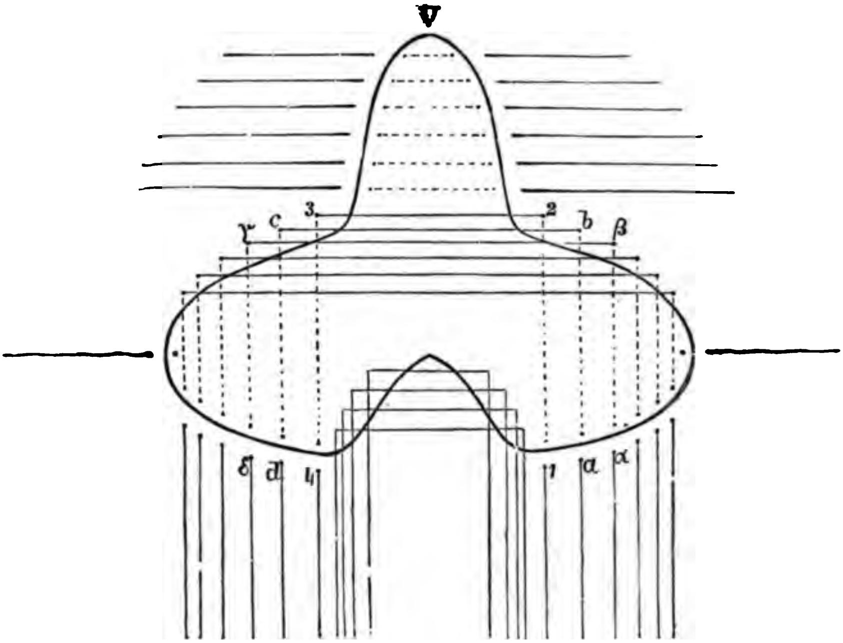


FIG. 80.—(After *Hildebrandt.*)

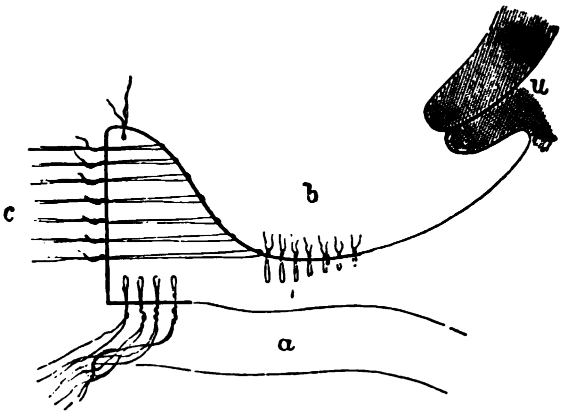


FIG. 81.—(After *Hildebrandt.*)

mucous membrane, they are passed entirely under the denuded surface. After the sutures have been passed down to the perineum, this is united by a quill suture passed deep under the tissues. A few superficial sutures are finally laid in the perineum, and in the vagina of silver, and the operation is at an end. The time for the removal of the quill suture cannot be definitely stated. From the third day on, the perineum must be carefully examined, and if a drop of pus appears along a suture the quill must at once be removed, and the surface sprinkled with iodoform. The vaginal sutures I leave for some time, although not for four to six weeks as do Hegar and Kaltenbach. After the third to the fourth day the patient receives a laxative (magnesia), and after each defæcation the rectum is washed out. The diet is simple.

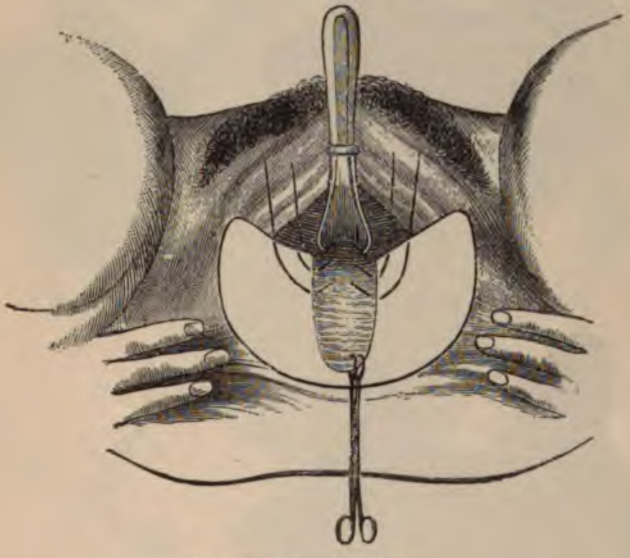


FIG. 82.—BISCHOFF'S METHOD.

Two essentially different operative methods are the *perineosynthesis* of Langenbeck, and Bischoff's plastic operation. Both depend on the fact that a flap of mucous membrane is dissected off, and is utilized for covering over the new perineum which is to be formed.

These operations suffice as well in case of laceration of the perineum, as in case of prolapsus. This, however, is not the place for considering the connection between prolapse and laceration.

In Bischoff's operation the flap is obtained in particular from the columna, and the first step is to mark out the surface which is to be denuded. The flap is next undermined, brought forward, and the denuded surfaces brought together. In passing the sutures the border of the vaginal flap is first united with the denuded edges next to the nymphæ on both sides, and six to eight sutures on each side will suffice. These sutures had better be of catgut or thin silk. The perineal sutures are next inserted from below upwards, and should be passed deeply. In order that the apex of the flap may fit well in the posterior commissure, it must often be trimmed off, and it may be held in place by inclusion in a perineal suture.

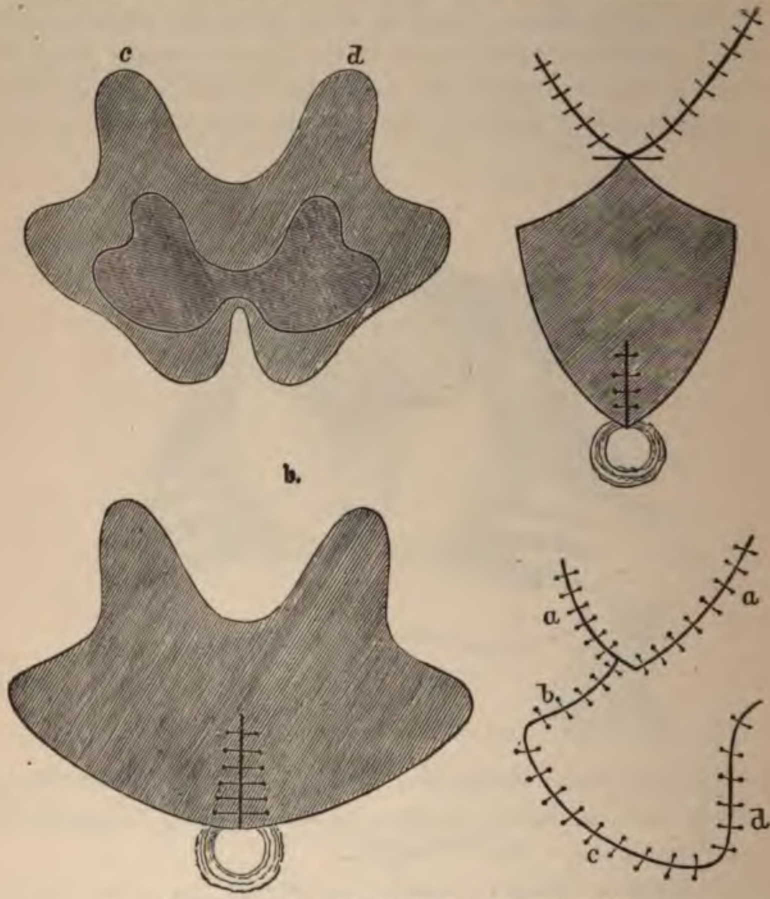


FIG. 83.—DENUDATION AND SUTURING. (After *Freund.*)

In case of incomplete laceration there is not much difference between

Langenbeck's and Bischoff's method. The latter denudes a trifle more anteriorly. The results obtained by Bischoff by his method are very good. Egli-Sinclair reports that in twenty-four cases union by first intention occurred in twenty-three, and that in three out of five cases there was no re-laceration at the next confinement.

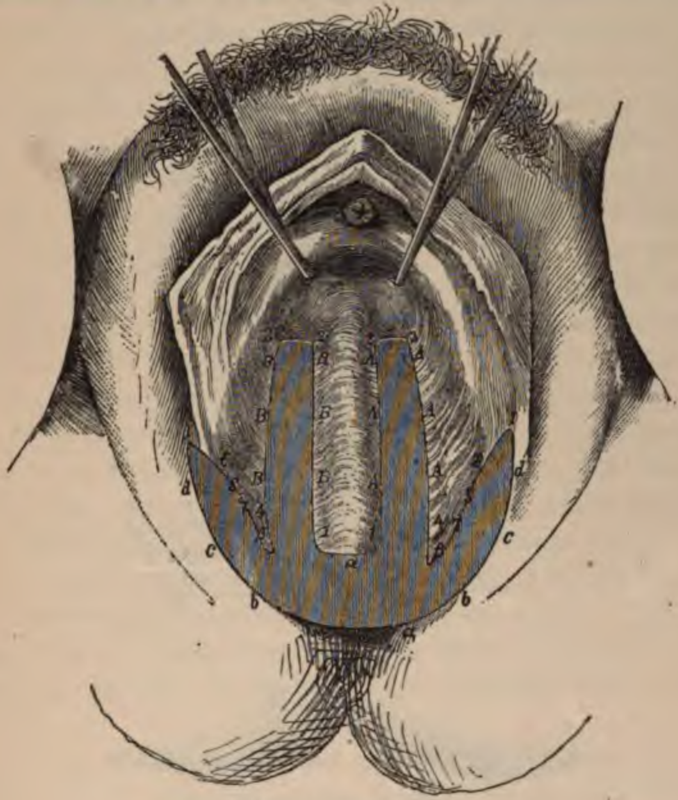


FIG. 84.—MARTIN'S OPERATION.

Freund's method differs from Hegar's triangular denudation in that by it a triangle is not removed from the posterior vaginal wall, but the columna rugarum are untouched, a tongue-shaped portion of mucous membrane being removed to the right or left, or to both sides of the columna. The annexed figures describe the method sufficiently. The lateral denudation each side of the columna serves the purpose of lessening the strain caused by the sutures. In Fig. 83 at *a* is shown the perineal rent and the denuded surface, at *b* is represented the appearance when the rectal sutures have been tied, at *c* the result of the union of the lateral wings at and after tying of all the sutures.

Although we have already referred to a number of modifications of the perineal operation, there are still others to be mentioned. Martin's method aims at restoring the lumen of the vagina to its original state. He does not think it necessary or advisable to denude the posterior columna, but deems the lateral denudations sufficient. The shape of the denudation obtained by this method is shown in Fig. 84. The two lateral denuded surfaces are first united, and then the denudation on the labia and the perineum. As in case of all operations on the perineum, it is essential that the denudation be not carried too far anteriorly, else the introitus vagina will be too narrow. Martin has reported over twenty cases operated upon after this method with general success.

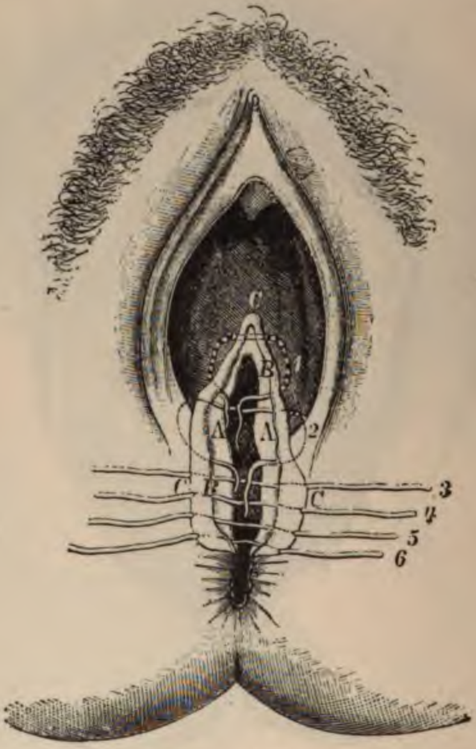


FIG. 85.—TAIT'S METHOD.

The latest plastic method on the perineum has been suggested by

Lawson Tait. The principle of the method is the dissection of flaps from above downwards to cover over the rectum, as it were. He removes no tissue and operates with sharp scissors. His sutures are inserted in the axis of the wound, and they surround and bring together large surfaces. The dissected flaps are large, so that there is no fear for their vitality. The upper suture is inserted first, and the points of entrance and of exit are near the line of union. The needle is inserted at the left border, and is passed around as is shown in the figure, issuing at the corresponding point on the opposite side. The suture should not appear in the rectum, and only the knot should be seen in the vagina. When necessary a second similar suture should be passed, but two are always sufficient. The remaining steps do not differ from what is customary. Tait uses silk, and removes the sutures on the twelfth to the fourteenth day. Staude has suggested a method on the same principle as Tait's, although his manner of passing the sutures has not the same advantages.

In order, after operation on the perineum, to facilitate the exit of gases and fæcal matter, and to avoid the tension on the newly united surfaces, Dieffenbach favored making incisions into the subcutaneous cellular tissue, parallel to the wound of the perineum, and Langenbeck followed him. Simon rejects these incisions, and indeed they are not able to fulfill the desired aim, for they are not made at the right place. In order to avoid tension on the sutures, the cause of the retention of the fæcal matter must be removed, that is to say, the sphincter ani must be incised. This was Baker-Brown's practice almost uniformly, and Hegar adopted the method. In his paper at Copenhagen, Köberle spoke in favor of it.

As yet we have not made special reference to the sutures of utility in operations on the perineum and the posterior vaginal wall. The choice lies between the ordinary surgeon's knot and the quill suture of silk, catgut, or metal. The running suture has been recommended by some, and Bröse has latterly favored it. In the only case in which I tried it the result was a failure, but this was in pre-antiseptic times. We have still to mention the Heppner's suture, which aims at bringing the surfaces together under equable pressure, and the manner of insertion is sufficiently clear from Fig. 86.

In case of incomplete lacerations I prefer Simon's method, as modified by Hegar and Kaltenbach. It is the simplest method of all. In case of complete lacerations, where a portion of the recto-vaginal septum is torn, I would place Lawson Tait's flap method above others. I formerly performed the Simon modified operation, but not always with the desired result. I have tried Tait's method in three instances, and each time have obtained union by first intention. In the first case I tried it after the usual method had failed, and I was highly pleased with the excellent result and the simplicity of the method.

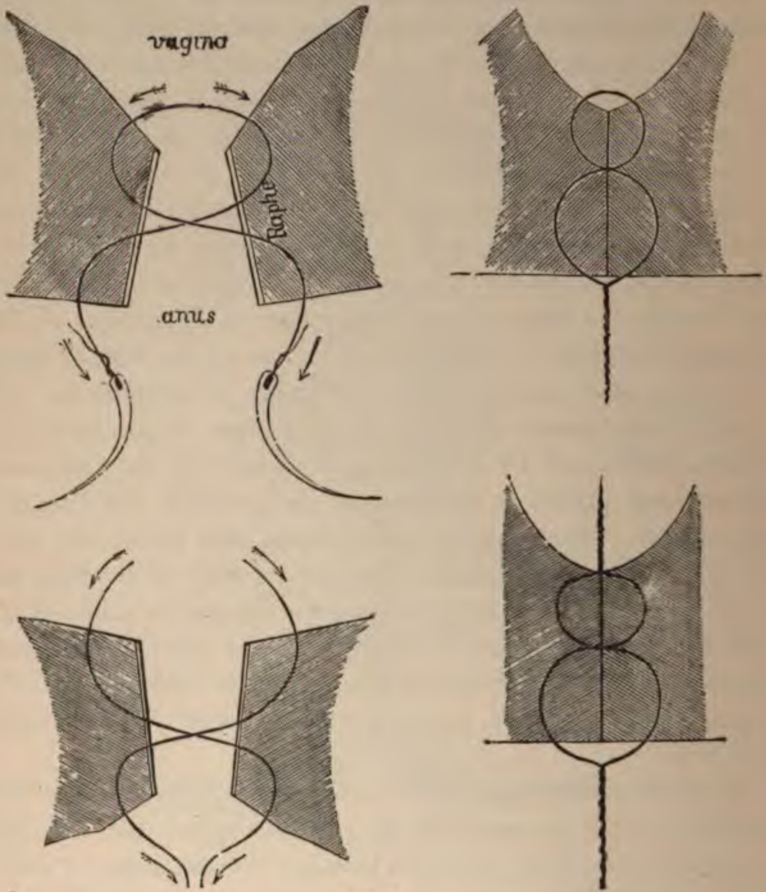


Fig. 86.

CHAPTER XIII.

VAGINISMUS AND REFLEX SPASM OF THE PELVIC FLOOR.

BY the term vaginismus is ordinarily understood great sensibility at the introitus vaginæ, which renders coitus impossible on account of reflex spasm. This only partially defines the affection, however, seeing that we do not often find a hyperæsthetic spot at the introitus whence emanates the reflex spasm.

So severe is the pain and the spasm, that women affected with vaginismus cannot endure sexual intercourse, and shun it even as they would the rack. The affection is met with particularly in the newly-married. Kiwisch, Simpson and Sims were the first to call special attention to this affection, although it had been frequently noticed before. Simpson gave it the name vaginodynia, Sims called it vaginismus, Kiwisch spasmus vaginæ. The latter considered it due to spasmodic contractions of the constrictor cunni, superadded to which, in aggravated cases, was a similar contraction of the sphincter ani and the sphincter vesicæ. It occurs frequently in hyperæsthetic women during coition, especially when they have no inclination for the act.

Sims believed vaginismus to be a neurosis, and not to be accompanied in very marked cases by inflammatory trouble—indeed that it had absolutely nothing of an inflammatory nature about it. Hyperæsthesia at a special spot in the introitus was the real test of vaginismus. Later, spasmus vaginæ was rather considered to be due to spasm of the muscles, independently of special hyperæsthesia in the introitus, and it is now definitely established that a spasm of the vagina, a tonic contraction of the sphincter vaginæ and of the perineal muscles, may occur without any local hyperæsthetic spot.

It is necessary to describe briefly this most delicate of all topics which concern married life. As a rule, and it is a natural one, virgins are thrown into a state of great nervous excitement when a vaginal examination is made, and they object to it strenuously. They contract the muscles as much as is in their power. If this happens when the finger is inserted, all the more does it occur at the first sexual commerce. When now there is superadded to the natural timidity of the woman the injury of her genitals, the result of lack of knowledge or nervousness on the part of the man, and whence the first contact may not effect intromission, the memory of all this may lay the foundation for vaginismus, and the increase of the pain at the succeeding attempts at sexual commerce will simply intensify the affection, and lead to loss of desire on the part of the woman; in fact the act becomes repulsive to her, and I am satisfied that we find herein an explanation of vaginismus. Winckel has reached a similar conclusion. It is certain that these ineffectual attempts at sexual intercourse make the affection worse, since they add to the excitability of the woman. It is further true, as was pointed out by Scanzoni, that a husband of weak powers may cause vaginismus through the irritation of the genitals, from futile attempts at sexual intercourse. Between nervous impotence of the husband and spasmus vaginæ of the wife, there is certainly a causal connection. The reverse conclusion, however, that in every case of vaginismus the cause lies in weakness of the man's sexual powers, is not tenable. It is self-evident, of course, that irritation and pain are more likely to occur in case there exists faulty inclination of the pelvis, where the introitus vaginæ is deep set under the symphysis. Schroeder has called attention to such cases, where the pubes extend even below the orifice of the urethra. The penis is in such cases directed too far backward, and strikes into the fossa navicularis instead of being directed into the vagina. The mucous membrane of this locality is thence irritated, is the seat of great pain and causes the young wife to loathe the idea of cohabitation. Naturally there is often present redness, swelling of the follicles, excoriations, small fissures and papillary excrescences, and then the act of coition is positively unbearable to the woman. Can now inflammation be the cause of reflex spasm or not? In what does inflammation in this locality consist? In a catarrh with profuse discharge, and such are the accompaniments of the redness, the swelling and the excoriation. Acute catarrh is rarely met with, but the mucous membrane is generally swollen, reddened, and very sensitive. Purulent discharge is rarely seen. Gonorrhœa is not at the bottom of reflex spasm, although

E. Martin claims that it is. It would be an absolutely false conclusion to consider the vaginismus of a young wife as dependent on a gonorrhœa of the husband. That reflex spasm will often find its explanation in a highly strung temperament, the so-called nervous, is very plausible, and is very evident from what we have already stated. West has seen vaginismus accompany the nervous and hysterical temperament in individuals otherwise healthy, and according to him there is a causal relation between this affection and hysteria.

Such are the common causes of vaginismus. Cases like that of Terbes, where a lady could not sleep at night on account of a sensation of spasm in the vagina, are very rare. The same remark is applicable to the view advocated by Arndt, that vaginismus is not an uncommon accompaniment of the neuropathic diathesis (?) and may lead to insanity, as also to the two cases of Neftels, where lead poisoning was the cause of vaginismus, in the one accompanied by purulent discharge and by paralysis, and in the other by colic.

As pointing to a common cause of vaginismus Hildebrandt's observation is of value, that women whom he could examine without finding vaginismus acquired the spasm after frequent after-examinations by the students. These cases clearly prove how vaginismus may not only be evoked from irritation of a painful spot in the neighborhood of the contracting muscles, but also in irritable individuals from the mere fear of pain, although the parts are not at all inflamed.

In Sims's first paper he laid stress on hyperæsthesia of the hymen as a cause of vaginismus, the affection only developing on irritation of this spot. Beigel agreed with him and claimed its existence in two personal cases. In the one case an unmarried woman of thirty-two woke up in the night suffering from great pain in the left side of the face, and a few days thereafter developed the same spasmodic pain in the left side of the vulva. Whenever the clothing touched this side of the vulva, she suffered from the cramp-like pain. On digital examination vaginismus was found to exist. In the second case the woman had in childhood long suffered from chorea major, and frequently was for months confined to her room. On her nuptial night she suffered such agony that further attempts at copulation were desisted from. She conceived, however, miscarried at the fourth month, but was still unable to endure the sexual act on account of vaginismus. Simpson considered the cause of such excessive vulvar pain to lie in a hyperæsthesia of the pudic nerve, and he, even as had Burns before him, counselled section of this nerve. The majority of writers, however, seek the cause of vaginismus in local changes in the hymen (Sims, Winckel and others).

We will briefly rehearse the various opinions. Demarquay, Ewart, Stoltz and Fritsch, believed in the existence of a fissure of the vulva. Demarquay also contended that fissure of the anus might cause vaginismus. Ewart found the sensitive spot, irritation of which would excite the spasm, to be at the carunculæ myrtiformes. Oldham laid stress on an inflammatory affection of the vaginal follicles; Braxton-Hicks on inflammation of the papillæ of the vagina; Tyler Smith and Spencer Wells believed it dependent on a vaginitis. Debout and Michon mention as the most frequent causes inflammation of the vaginal mucous membrane, herpes and eczema of the vulva, inflammation of the mucous glands, fissure of the introitus vaginæ. Fritsch also found a small excoriation, covered over with a yellow deposit, situated at the introitus, to be the seat of the excruciating pain. Vedeler has latterly reported two cases where the cause of the vaginismus was fissure of the anus. Schroeder and Scanzoni lay great stress on ineffectual attempts at cohabitation as a cause.

When now we consider the question of vaginismus from an etiological standpoint, the fact results that there are two varieties: the one and the most frequent depends on tonic reflex contractions, the result of local irritation and more or less dependent on lack of self-control and willful contractions; the other must be considered a purely hyperæsthetic form, and there are found sensitive spots, sometimes red, and again smarting. In illustration of this form we will relate the following personal case: At her first confinement a woman suffered rupture of the perineum, which was sewed up and healed only partially, a recto-vaginal fistula remaining. At the operation for the closure of this fistula the left labium minus was lacerated by the speculum. Both nymphæ became swollen and reddened, and when they were touched, or a vaginal examination was attempted, the patient became frantic, and had spasm of the constrictor cunni, although there was no evidence of abrasion or excoriation or recent wound.

The diagnosis of vaginismus is not at all difficult, if we only take notice of the spasmodic contraction at the introitus. It may be difficult, however, to determine the source of the spasm and of the pain. We must first look for fissures, excoriations, at the introitus, for inflammatory swelling of the hymen, the carunculæ myrtiformes, the glands of Bartholin, the mucous membrane of the vagina, etc. Note is to be taken of the inclination of the pelvis, of the position of the vulva. Finally, we should not omit to seek for fissure of the anus as a case of vaginismus. Hildebrandt suggests too that the pain may also depend on disproportion in size between the male and the female organs.

The treatment of vaginismus varies, of course, according to the cause, and also is it different according to the theoretical view held in regard to the disease. Those reflex spasms which result from great pain at the first sexual intercourse, require different treatment from that which depends on local hyperæsthesia. A glance at the literature of the subject will prove the truth of my statement, that the treatment varies according to the theory held as to the origin. What useless disputes in regard to the value of hyper-extension or antiphlogistics in the cure of the affection! The truth is that vaginismus has been cured in both ways.

When careful inspection of the vulva reveals nothing abnormal in the mucous membrane, only a highly reddened succulent condition of the surface between the labia and the introitus, a papillary condition, so to speak—when, further, we notice that the mere touch of any portion of this surface evokes a reflex spasm, which interferes with the insertion of the finger—when, still further, we hear that the woman, only recently married, cannot submit to intercourse on account of the pain, then we are justified in accepting Scanzoni's view: The vulva is irritable from frequent ineffectual endeavors at copulation, and its reddened, swollen, sensitive condition warrants the use of the term inflamed. Here rest of the parts and antiphlogistic measures will effect cure, and after the disappearance of the redness and local sensitiveness, sexual intercourse will be facilitated by hyper-extension under anæsthesia.

If, on the contrary, a local hyperæsthesia is found, this must be allayed before we can hope to see the vaginismus disappear. We must, however, most carefully seek for the hyperæsthetic spot, for if we draw a false inference as to the cause and resort to hyper-extension, and thus make a hyperæsthetic spot, the affection is intensified instead of being cured.

Among the antiphlogistic measures, we mention lukewarm water compresses, lead wash, phenic acid solutions (2 to 5 per cent.), black wash. We especially recommend regular application of nitrate of silver solutions (2 to 5 per cent). Dilute tincture of iodine is also advocated. In case eczema or erythema is present, then white precipitate (ʒ ss to ʒ j to ℥ ss of vaseline) or sublimate (gr. xv. to ℥ ss) ointments are useful. Sitz baths, warm or hot douches, medicated, are of value. In case of general neurasthenia, the bromides, etc., are indicated. Guéneau de Mussy orders suppositories of the bromide of potassium. Naturally the woman must abstain for awhile from sexual intercourse.

The next step aims at rendering possible the sexual act by overcoming the intensity of the spasm, and this is accomplished by hyper-distension of the introitus vaginæ, under, of course, narcosis. For the purpose of distension Sims preferred glass dilators. The ordinary cylindrical speculum has been used, as also Simon's blade specula, traction on which by the hand distended the introitus. Personally we prefer stretching with the fingers of the hand. This method was first recommended by Charrière, Horwitz, Courty and Sutugin, and has been used by Hegar. We can thus feel the muscles yield and tear, which subcutaneous separation renders unnecessary the cutting of the constrictor cunni, which Sims deemed advisable.

When we find hyperæsthesia in spots, this must be allayed by means of local treatment. In case the hymen or a remnant of it is at fault, this must be excised. If there are excoriations and fissures and whitish patches on the mucous membrane, these must be thoroughly cauterized. The most commonly used caustic is the stick of nitrate of silver, followed by ice compresses. The slough separates in a few days, and the cicatrix resulting from the granulation process is not sensitive. Of course other caustics may be used, such as chromic acid, the thermo-cautery, etc. In this variety of vaginismus, hyper-distension is not useful, since the reflex spasms disappear after the healing of the hyperæsthetic places.

Simpson performed section of the pudic nerve; but to-day this is not deemed necessary. The procedure is subcutaneous and free from danger, but there is no certainty that the nerve has been cut.

Sims's suggestion to cause the husband to cohabit while the woman is under the influence of an anæsthetic, in the hope that cure may follow on labor, is for many reasons not to be recommended.

In case of fissure of the anus and resulting vaginismus, Vedeler has hyper-distended the sphincter ani, and cured both the painful defæcation and cohabitation.

In addition to spasm of the constrictor cunni, the usual cause of vaginismus, Hildebrandt directed the attention of observers to spasm of the levator ani. He saw cases where the constrictor cunni gave rise to no trouble on cohabitation or examination, but where the obstacle was met with deeper in the vaginal canal, and this obstacle was found to be due to a tonic contraction of the levator ani. In the three women where this was noted, there existed hyperesthesia of one or another of the internal genital organs. In one there was a prolapsed very sensitive ovary. The woman had been subject to nervous affections in infancy. The two other

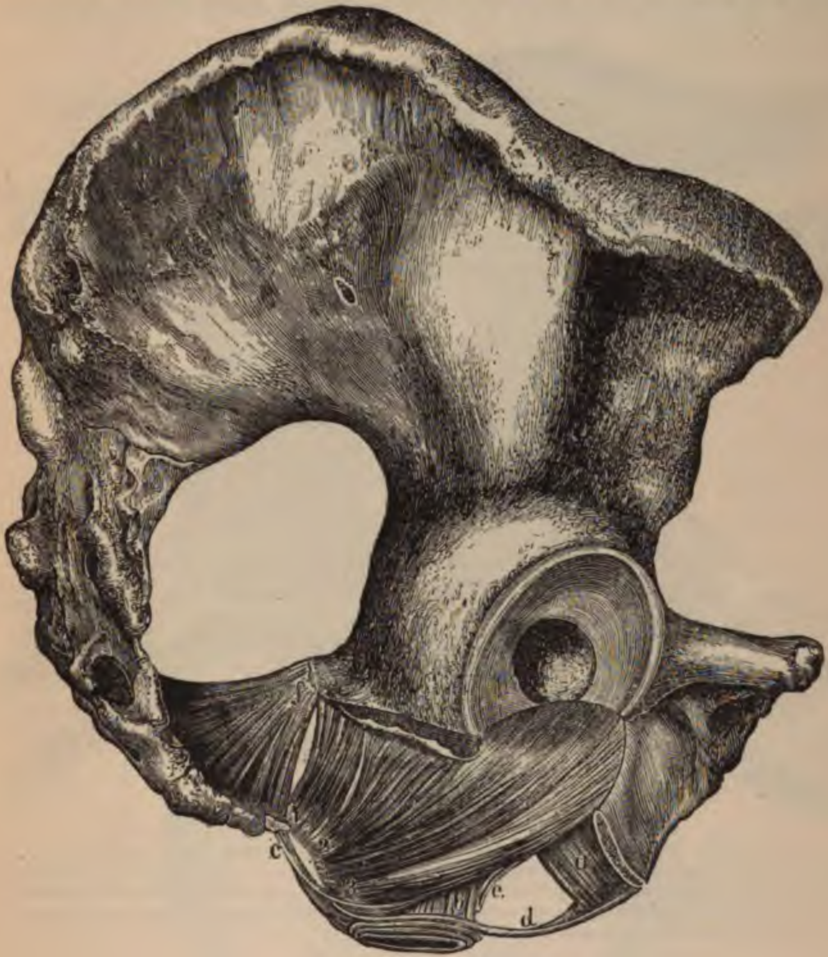


FIG. 87.

women presented very painful tumors of the portio vaginalis, associated with great vaginismus interfering absolutely with sexual intercourse. Removal of the tumors cured the vaginismus.

No one will seriously contend that such reflex spasm is limited to a single muscle. It is only natural that it should affect the entire group of muscles. Certain patients with an anal fissure suffer from vaginismus, while in others during the spasm the muscles of the perineum are tensely contracted. Naturally enough then, when there exist painful parts higher up in the vagina, as for instance very sensitive erosion, other groups of muscles and the levator ani as well are spasmodically affected. There results, thence, an obstacle to the insertion of the speculum, and the intro-

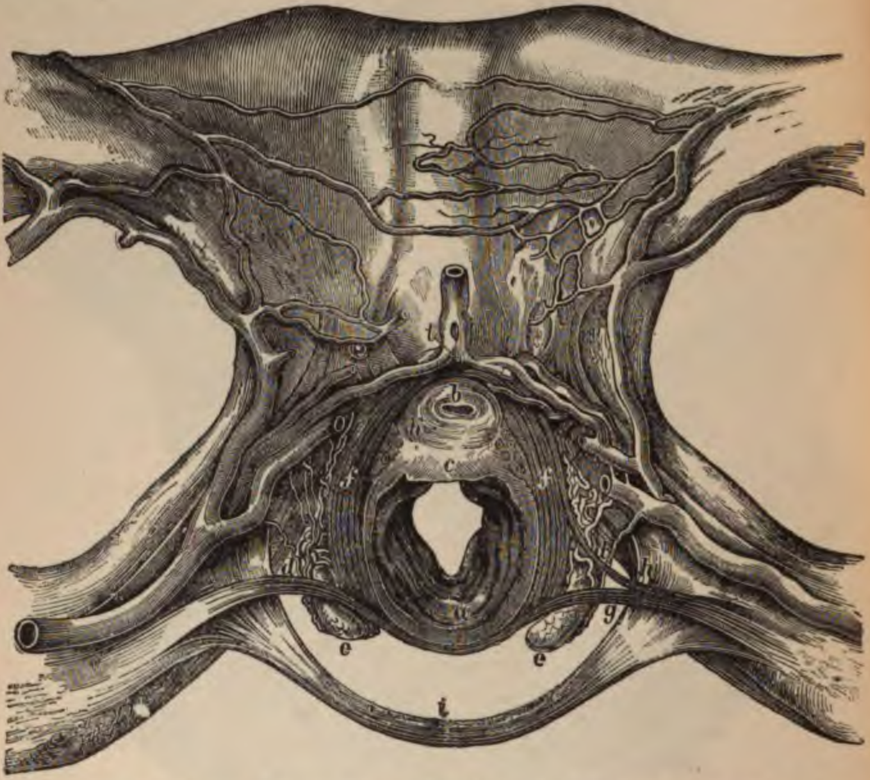


FIG. 88 THE SPHINCTER VAGINÆ. (After *Luschka.*) *a*, The vagina; *b*, the urethra; *c*, the urethro-vaginal septum; *d*, vestibular angle; *e*, Bartholinian glands; *f*, constrictor cunni (deep) and sphincter vaginæ; *g*, transversus profundus, from which extends a fasciculus, *h*, which is attached to the constrictor cunni profundus and makes traction on it. Behind the profundus lies the superficial transverse muscle, *i*; *t*, vena dorsalis clitoridis.

duction [illegible]
the pelvis [illegible]
(a) and [illegible]

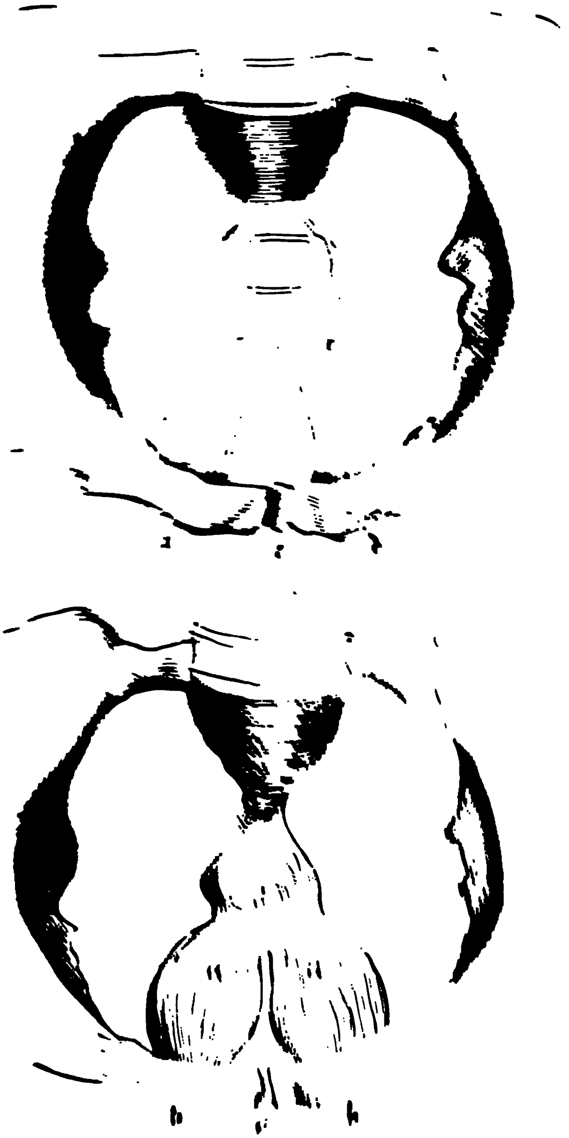


FIG. 40. A and B. a, [illegible] pelvis; c, symphysis pubis

sphincter ani, the internal bundles of which form the sphincter, while the external cross and join the fibres of the constrictor cunni, to form a bundle (*c*) which extends backwards to insert at the apex of the sacrum. The fibres of the levator ani or the diaphragmatic muscle of the pelvis surround the rectum. A few fibres (*e*) arch over the anterior surface of the rectum, but the vast majority lie under it, and they are divided into three portions, the one inserted on the sacrum, the other extending across the pelvis, and the third merging with the fibres of the external sphincter ani. The fibres which extend from the pubes, the pubo-vesical ligament, and the ischium, come together near the vagina, and are united to it by fibrous not by muscular tissue. Energetic contraction of the levator ani may, according to Luschka, lift the vagina anteriorly, and even compress it a trifle from side to side, but the canal can never be closed by this muscle. Hildebrandt is right then in his belief in regard to the muscle opposing the insertion of foreign bodies into the vagina, but from an anatomical standpoint, he is wrong in the assumption that it may cause tonic spasm. One of his observations finds a more rational explanation in contraction of the constrictor cunni, together with approximation of the fibres of the levator ani. It is certain that this latter muscle cannot alone cause closure of the vagina, since it does not surround this canal. As for the constrictor vaginæ superior, supposed to exist by Sims, it is likely enough only the muscular layer of the vaginal wall.

CHAPTER XIV.

PRURITUS VULVÆ.

IF this term were rendered into German, we should call it the "itching disease" of the external genital organs. Itching may result from a number of causes, and in the vast majority of cases pruritus vulvæ is only a symptom of one or another affection. There are cases enough, however, where we may search in vain for the special affection causing the symptom. As to whether we should here consider the itching as a neuralgia or not is very questionable. Beigel thinks that the term should only be applied to those cases where the sensation of itching is of central rather than of peripheral origin. While in the majority of instances we are able to find local explanation for the symptom, there is still a minority wherein we can detect no local changes, and we must consider the cause as lying in the nervous centres.

Itching compels scratching, and even if the patients try to resist the desire they cannot. Friction by the clothing, etc., adds to the itching a burning sensation. The pruritus is most frequently seated around the clitoris, and next the mons veneris and the origin of the labia majora. There are cases recorded where the clitoris alone was affected (Kuchenmeister). The pruritus, however, may invade the vestibule and even extend into the vagina. The manipulation of the itching part may have a bad effect on the health, since it may lead to masturbation. All women suffering from pruritus are nervous. When the itching obtains mastery over the individual, the entire force of the will is necessary to effect a cure, and this force the patients have ordinarily lost. They seek solitude, and not infrequently end in an insane asylum. Onanism may be the cause of pruritus, since young girls so irritate their genitals as to cause abrasions which in healing cause itching (Carl Mayer); but ordinarily it is rather the pruritus which leads to masturbation.

Pruritus and the resultant onanism, are to be carefully differentiated from nymphomania, which is ever a disease of nervous origin, leading the patient to seek in the most shameless way the normal gratification of her sexual appetite. Women who masturbate, on the other hand, rather shun than seek sexual intercourse.

The pruritus is not constantly present, but recurs at intervals. The attacks are most intense at night, the increase being due to the warmth. In certain patients long sitting, in others walking, with the consequent friction of the genitals by the clothing, in others still irritation by the urine, cause an attack. Hildebrandt claimed that great congestion of the genitals may cause pruritus vulvæ. The following facts speak in favor of this view; many patients have to beware of alcoholic drinks, lest there result pruritus; in others long retention of urine or obstinate constipation brings on an attack. The most intense attacks frequently precede by a longer or shorter interval the menstrual period; and, finally, pregnancy is in many women the cause of pruritus, in these instances the attacks either accompanying the beginning or the end of pregnancy, that is to say, at the periods of greatest congestion, the result of increase of abdominal pressure through the enlarged uterus. (Hildebrandt.)

The changes which we find on the genitals in case of pruritus are, in an early stage, very red, slightly œdematous spots on the nymphæ, and red, shiny isolated spots deprived of epithelium, and secreting a watery product. On the labia majora the same appearances are found, and later on the results of scratching. The skin is then moist, thickened and covered with furuncles. When eczema, herpes, intertrigo, etc., are found on the external genitals, we may justly consider these affections the cause of the pruritus, and cure the latter by treating the former.

If by pruritus vulvæ we mean an affection in which itching is a constant symptom, then is it a very frequent one both in adults and in maidens. In children a very common cause is the oxyuris vermicularis, which travels from the anus into the vagina, and irritates the canal. Additional causes are dirty habits or vaginal and cervical catarrh accompanying scrofula.

Pruritus is a frequent symptom of diabetes, and is caused by the spores which are deposited on the genitals from the sugar-laden urine. Spores of various nature are, however, found on the mucous membrane of the vestibule, and yet the woman may not complain of pruritus; and again in case of diabetes itching may be a prominent symptom without there being a discernible lesion. In many instances the secretion from a carcinoma causes pruritus through its acidity. Kaposi states that he has often noted pruritus precede for a number of years the development of carcinoma of the uterus. Chronic gonorrhœal catarrh, and, according to Hewitt, non-specific catarrh, especially in the aged, are causes of pruritus. It is well known what excessive itching accompanies all diseases of the skin, such as the intertrigo of stout women, herpes, eczema, follicular and furuncular eruptions. The majority of these affections only cause itching during the period of subsidence. The pruritus becomes chronic and constant when the patients have scratched and constantly laid bare the superficies. Many women state that pruritus invariably sets in after the scratching. In addition to these eruptions in the course of which pruritus may develop, we must mention prurigo proper, where the itching is the essential factor. We have already spoken of the pruritus which may affect pregnant women, and which Hildebrandt explains on the theory of congestion, as well as the itching of the external genitals, which is at times met with in case of ovarian tumors, retroflexions, hypertrophies and chronic inflammatory affections of the uterus, without there being present any appreciable change in the external parts. We think that such an explanation is at best only plausible.

Since now there exist so many possible causes of pruritus, it seems unnecessary to seek for central purely hypothetical causes. Cases which are purely dependent on some central affection of the nervous system have not as yet been seen.

The diagnosis of pruritus vulvæ depends, of course, on the determination of the cause. The prognosis will depend on the cause, the pathological alterations due to friction and to scratching, and especially as to whether the patient has acquired the habit of masturbation or not.

It is apparent that no definite rules can be laid down for the treatment of a disease of such variable etiology. In many instances the apparent changes are unimportant, but the affection is by no means so. The causes of pruritus are so manifold that, as Graily Hewitt expresses it, "we must treat everything whether it be a cause or a follower of the disease." Regulation of the diet, of the manner of life, of the bowels, must be strictly attended to. Vegetable diet, the avoidance of heating drinks, regular washing of the genitals and injections of the vagina, such are general means. Of local medicaments there have been recommended: applications of dilute solutions of nitric acid, especially where the sensation is rather of burning than of itching: compresses of black wash between the labia, as long as the inflammation is acute; belladonna and lead ointment; bromide of potass. where masturbation is the habit, cannabis indica where there is sleeplessness, which drug Hildebrandt ranks above belladonna, opium, morphine or chloral.

Authorities differ greatly in the means which they recommend for cure, which proves that there are many means of reaching the desired end, and that in certain instances, all means are devoid of benefit.

Scanzoni advocates smearing the affected parts with chloroform liniment (chloroform gr. xxv to ℥ j olive oil). West recommends a mixture of hydrocyanic acid, gr. 100 (!) with aqua goulardi, ℥ iii, but he prefers a lotion of borax and morphia (borate of soda, ℥ ss, muriate of morphia, gr. 7, rose water ℥ x, ft. lotio.) Internally he gave in case of intense pruritus, three grains of quinine every six hours, and belladonna and camphor pills, pushed until the system was well under the effect. Externally he applied an ointment composed of extract of belladonna gr. iv. and spermaceti ointment and glycerin equal parts, ℥ ss.

In case of intense pruritus in a pregnant woman accompanied by attacks of neuralgia, Page used washes of borax, opium and glycerine without effect. Chloral hydrate was more effective, associated with washes of an emulsion of bitter almonds. On the tenth day of the puerperium the itching disappeared.

Other physicians make daily applications of carbolic acid solution to the cervix, and administer it internally as well. These applications are based on the belief that the cause of the pruritus lies in hyper-secretion of the cervical glands. Still others recommend an ointment composed of carbolic acid, glycerin and citrine ointment, or else applications of corrosive sublimate (1:1000). In intractable cases Braün uses equal parts of carbolic acid and alcohol, painted on the affected parts for eight to fourteen days, together with lead ointment. Schröder prefers carbolic acid, 3 to 10 per cent., together with sitz baths, above all other remedies. Scanzoni used chloroform oil (3:30) and alum, from which drug Schröder states he has never obtained any effect. West and Martin alcoholic solutions of tar (4:30) or with glycerin; Wiltshire 3 per cent. solutions of borax alone, or in combination with hydrocyanic acid, veratria, morphia, or chloral. Latterly I have been using solutions of cocaine with good results. In case of cutaneous pruritus, or very chronic cases, resort to Carlsbad is to be recommended. Cold water or ice applications are also of value.

CHAPTER XV

COCCYGODYNIA.

UNDER this name is understood a severe pain localized over the coccyx. The pain is characterized as dull and dragging, often very severe like that of toothache (Scanzoni). It increases in intensity on protracted pressure on the coccyx in the sitting posture, and grows less or disappears entirely on the assumption of the lateral decubitus. The pain is greatest on sitting down and in rising. Many patients are also unable to walk.

Examination of and motion imparted to the coccyx by the finger, evokes the same pain, especially any motion imparted to the bones. It is apparent, hence, why constipation and cohabitation may cause intense coccygeal pain. Scanzoni found it necessary to prohibit sexual intercourse for a protracted period. The menstrual periods aggravate the pain, and Scanzoni had a patient who only suffered from the affection at these times.

Coccygodynia affects in particular married women, but only because they are more exposed to certain of the causes than the unmarried. There are cases recorded where nulliparæ and even children of four to five years suffered from the affection (Hörschelmann). Although men may be affected, it appears most frequently in women, and usually as the result of child-bearing. We will first sketch the etiology of the affection and then treat of this special point more in detail.

Generally coccygodynia follows on protracted or instrumental labor, falls, riding (Scanzoni), the influence of cold (Blit). It is often seen as an accompaniment of uterine and ovarian diseases, and the disappearance of the affection on the cure of such diseases would seem to prove a causal connection. West believes the pain in case of uterine or ovarian disease to be sympathetic. The question arises as to whether we are here really dealing with coccygodynia. We have defined the affection as a disease characterized by pain on motion of or interference with the coccyx.

Now the pain accompanying uterine disease may or may not be localized over the coccyx, and this pain is hence not due to coccygodynia. Labor is by all odds the most common cause, as a result of the great pressure on the coccyx. Scanzoni's observations on this subject are noteworthy, and he has given us the best description of this affection. He met with the disease only in women who had borne children. Nine of the women stated that the pain had first appeared during the puerperium. Of the nine, six had borne but one child, and in five of these delivery had been accomplished by the forceps. In these instances, then, there has either occurred dislocation of the coccyx, or else such strain of the ligaments as to render passive motion of the bone acutely painful. Coccygodynia also results from inflammation of the bone. Nott, who extirpated the coccyx, found it carious. In many cases the coccyx is dislocated, and the pain disappears in case of ankylosis. Likely enough in instances of coccygodynia, which do not yield to treatment, there exists caries. From Hyrtl's observations it results that of one hundred carefully examined pelves, there existed luxation of the coccyx in thirty-two with consecutive ossification.

In case of marked pressure of the coccyx backwards, the sacro-coccygeal and lateral coccygeal ligaments are naturally strained, and there occurs also a separation of the bones one from another, and even luxation from the fifth sacral vertebra. As a result of the traction and dislocation, the coccygeal nerves are irritated, and this would explain the excessive tenderness. In two of Scanzoni's patients the skin over the coccyx was very red, and the bone was very movable posteriorly. Often while under observation, great anterior ankylosis resulted. In two of the same gentleman's cases, the disease had followed on riding. The one patient began to ride at fourteen, was married at twenty-one, and was delivered normally at twenty-three. Three months afterward she again mounted a horse, but in a few minutes she suffered from such excessive coccgyeal pain, that she had to desist from riding. The second patient had been delivered twice, and complained of frequently recurring metrorrhagia. Fourteen days after delivery she noticed for the first time pain in the region of the coccyx. One half year later she went out horseback riding, and on her return complained of such great pain in the coccygeal region that she fainted. From this time forth until two years after, when Scanzoni saw her, she suffered from coccygodynia. We might expect the affection to develop from the way women sit in their saddle, yet since Scanzoni's case no others have been recorded.

One of my patients, a virgin, fell backwards against the leg of a chair, and from this time forth suffered from pronounced coccygodynia, which resisted treatment for a year, and then gradually disappeared.

The chief symptom is pain, which is localized by the patient over the coccyx. Many patients told Scanzoni that the small bones at the anus were painful. The pain was generally localized over the coccyx, and the lower part of the sacrum. The locality was painful to pressure, and more to forward pressure than to backward, from the vagina or the rectum. The patients bore least of all an attempt to push the coccyx from its position. (Scanzoni.) We have already spoken of the influence of menstruation and of affections of the genital system.

The diagnosis of coccygodynia is not at all difficult. Motion imparted to the bone, especially by the finger, must be painful.

The first two cases of this disease were described by Nott (1844) under the name neuralgia of the coccyx. The patients were cured by extirpation of the bone. The one had become subject to the disease, as the result of a fall, the other from fracture of the ankylosed coccyx during labor. In the next monograph on this subject, by Simpson (1859), the name coccygodynia was given to it. For the most complete description, however, we are indebted to Scanzoni, 1861. His work records the histories of twenty-four cases, which he saw within four years.

The prognosis as regards cure is not absolutely good. The majority of the cases have remained uncured, or else passed out of observation before cure was effected. In Scanzoni's twenty-four cases cure was noted ten times, nine were improved, two not benefited at all, and in three the result is not stated. Scanzoni noted recurrence in patients who had remained well for from six to eight months. The difficulty of cure and the frequency of recurrence is explained by the number of muscles which are attached to the coccyx; the coccygeal, the levator ani, the sphincter ani, and muscular bundles from the gluteus maximus. Marked contraction of any one of these muscles may irritate anew the coccyx and cause recurrence of the old pain.

Since traction on and movements of the coccygeal joints are the chief causes of the pain, our aim should be directed towards preventing these. Rest in the lateral posture and soft fæcal passages will accomplish much.

In recent cases antiphlogistics are indicated, such as leeches, ice applications over the coccyx; after healing of the leech bites, poultices and painting with iodine. Generally, however, the affection is chronic when the gynecologist sees it, and then for the pain suppositories of morphia and belladonna or hypodermatic injections of morphia are indicated. From the use of the latter Scanzoni witnessed the entire disappearance of the symptom. Injections of atropine were also tested by Scanzoni, but he did not find them as effective as the acetate and the double meconate of morphia.

In addition to the above palliative means, there are a number of drugs which may be given in a tentative way. In case of the rheumatic diathesis Veit recommended the wine of colchicum seeds and vapor baths. Hörschelmann gave to his two patients three drops of the tincture of aconite every two hours night and day. Bergmann has reported a case where eight applications of massage permanently cured.

The ultima ratio is extirpation, even as Nott did in his first reported case. Simpson advocated giving complete rest to the bone by performing subcutaneous tenotomy, and severing all the muscles attached to the bone. The little knife was inserted at the apex of the bone, passed flat along its posterior surface, and the muscles of both sides and of the apex were severed. In many cases it sufficed to cut only the insertion of the gluteus maximus on one or the other side, or else that of the levator and sphincter ani. This subcutaneous tenotomy is simple of performance and not painful, and the incisions heal quickly. But all the cases in which it has been resorted to have not been cured. Simpson himself tells us that in one case it failed, and he was obliged to lay bare the coccyx and to remove it at the junction of the second and the third bone. In Nott's operation the bone is dislocated, and then cut out with the knife.

In 1870 Amann reported a similar case which had failed to yield to antiphlogistics, to galvanism, and to tenotomy after Simpson's method. Extirpation was followed by cure. In 1870 a case was also reported by Plum, who removed the entire bone on account of forward dislocation, and where cure eventually resulted.

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